Title	An empirical study
Other Contributor(s)	University of Hong Kong
Author(s)	Tang, Wing-tai; 鄧永泰
Citation	
Issued Date	2008
URL	http://hdl.handle.net/10722/131014
Rights	Creative Commons: Attribution 3.0 Hong Kong License

THE UNIVERSITY OF HONG KONG

AN EMPIRICAL STUDY: THE RELATIONSHIP BETWEEN STORE SIZES AND FLOOR LEVELS OF MULTILEVEL SHOPPING CENTERS IN HONG KONG

A DISSERTATION SUBMITTED TO

THE FACULTY OF ARCHITECTURE

IN CANDIDACY FOR THE DEGREE OF

BACHELOR OF SCIENCE IN SURVEYING

DEPARTMENT OF REAL ESTATE AND CONSTRUCTION

BY

TANG WING TAI

HONG KONG

APRIL 2008

Declaration

I declare that this dissertation represents my own work, except where due acknowledge is made, and that is has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

Signed: _____

Name: _____

Date: _____

Acknowledgements

I would like to express my sincere thanks to my supervisor, Dr Edward C.Y. Yiu for his continuous guidance, patience and support throughout the whole process of this dissertation. Without his kind support and inspiration, I would not have been able to complete this dissertation.

I also wish to acknowledge my friends, Ms. Iris S. Y. Wong and Ms. Erica F. Y. Chan, for their continuous support and encouragement.

Abstract

Multilevel shopping centers are commonly found in Hong Kong. However, no prior research has been conducted in relation to the vertical malls. Mall managers find themselves in a mess that they based on nothing but personal experiences when deciding strategies towards space allocation and tenant placement issues. Considering the retailing environment in shopping centers as an ecosystem in which the three stakeholders (retailers, shoppers and mall managers) coexist and prosper is no longer a new idea. By incorporating this idea, this dissertation investigated empirically the relationship between the size of a retail shop and its floor level in multilevel shopping centers in Hong Kong. Three malls of different sizes are studied, and the result, consistent with the prediction using ecology theories, is that retail shops located at a higher level in a shopping center is larger in size. The result in this study has far-reaching implications. First, it provides a clear guideline towards tenant placements issues within vertical malls in Hong Kong, which can facilitate the decision-making process of mall managers. Second, it provides further empirical evidence towards the applicability of ecology theories in explaining the retailing activities in shopping centers.

I. Declaration

II. Acknowledgement

III. Abstract

IV. Table of Content

V. List of Illustration

Figures

Tables

1. **Introduction**

1.1. Background

- Shopping Center Industry in Hong Kong

In Hong Kong, since land is in scarcity and hence very expensive, it is not uncommon to find planned[1] and enclosed, regional or metropolitan[2], multilevel shopping centers rising up to four or more levels.

> *"Land use regulations in Hong Kong determined height and bulk for buildings to compensate for the paucity of useable land in the city … Hence, single-storied 'big-box' stores were precluded from the start."* (C. Irazabal & S. Chakravarty, 2007)

Without doubt, in a small region like Hong Kong, the development of large-scale multilevel shopping centers seems to be the only way out in the industry. In fact, with the establishment of multilevel shopping centers like APM[3] and MegaBox[4] in recent years, shopping center industry has become more important in Hong Kong retail market.

---

[1] A planned shopping center refers to a mall which is deliberately developed in a coordinated manner for retail use. Planned centers are usually under single ownership and managed and marketed as a unit.
[2] Refer to Chapter 3 for definitions
[3] A 6-storey metropolitan mall of 60,000m^2 located at Kwun Tong, Hong Kong, opened on 17th July, 2005 and was developed by Sun Hung Kai Properties Limited.
[4] A 19-storey metropolitan vertical mall of 110,000m^2 located at Kowloon Bay, Hong Kong, opened on 1st June, 2007 and was developed by Kerry Properties Limited.

> *"Vertical merchandising is used increasingly as the solution to restricted sites and the need to bring stores closer together for the convenience of shoppers. Multilevel malls reduce site coverage and walking distances between stores…… [and] allow a regional center to include a mix of uses in compact buildings on restricted-area, high-cost sites."*(Beyard, M.D., W.P. O'Mara, et al., 1999)

However, multilevel shopping centers are more difficult to be managed compared with single or double-floor shopping centers (like those in western countries). It is therefore in existence an increasing demand in better shopping center management techniques, e.g. tenant placement and space allocation. This is particularly true when considering tenant placement and space allocation issues during the planning stage of the shopping center. In practice, however, mall developers or mall operators can only rely on their respective experience in this industry. The flow of information between different developers is very limited due to commercial reasons.

- Lack of Researches

Previous studies fail to consider the tenant placement and space allocation issues with reference to multilevel shopping centers despite its importance to Hong Kong shopping center industry.

Tenant placement is very complicated, especially in multilevel malls. On one hand, it affects the pedestrian flow of the mall which deters its success and the developer's profit. On the other hand, location is very important and specific to retailers, i.e. "a location, or level, that is advantageous for one type of business may be entirely inappropriate for another".(Beyard, M.D., W.P. O'Mara, et al., 1999) Thus, the business environment on a higher level of a mall is completely different from the one on a lower level. Clearly, shops located on a lower floor enjoy a higher accessibility than ones located on a higher floor. (Sim, L. L. & Cheok, R. W., 1989) Despite that a number of authors mentioned the relation between tenant placement and pedestrian circulation; no prior studies were related to multilevel shopping centers in Hong Kong. Therefore, this study serves as the first attempt to explore the 'vertical' malls in Hong Kong.

Space allocation receives much less attention than tenant placement issues in terms of academic studies. Despite a saying in shopping center industry that 'any store size is acceptable if it is not too big', store unit size affects the rental burden of tenants and the profitability of developers and should therefore receive more attention. Besides, there is no general management guideline in relation to retail space allocation within the mall. Managers depend on nothing but their respective experiences and the issue subjects largely to market forces (C. Irazabal & S. Chakravarty, 2007). As such,

customer-generating anchor tenants[5], who have higher bargaining powers, were always at an advantageous position. Not only do they benefit from lower rental levels, but also from better choices of locations. Although this practice hammers mall owners' profits, it is tolerated by mall operators for fear of losing the anchors. One reason for that would be the absence of clear guidelines towards space allocation and tenant placement in shopping centers. In light of this, this study aims at investigating the space-level relationship in malls and hence providing some insights towards the problem.

Actually, the fact that the interrelationship between the three stakeholders (shoppers, retailers and mall operators) has seldom been addressed in previous studies limits the scope of findings. Recently, the independence between the three parties can be described in ecology analogous[6] (Yiu, C.Y. & Yau, Y., 2006). The authors describe the retail environment in shopping centers as an ecological environment in which shoppers, retailers and mall operators co-exist and predator-prey interactions take place between them. The authors successfully formulated a pioneering framework[7] for further dynamics between two different academic categories. However, the framework is meaningless without more support from empirical tests. Thus, by

[5] The largest or any very large store within a shopping mall: usually a supermarket, variety store or department store.
[6] Refer to Table 1
[7] Refer to Figure 1

incorporating the idea into this study, it aims at providing further evidence towards the idea.

- Research Significance

While a great deal of research attention has been placed on the linkages between tenant mix[8] and rental income in a retail facility, the facility's physical attributes have never been seriously studied (S. M. Chiu & Y. Yau, 2007). In this dissertation, it aims at exploring the relationship between store unit size and floor level of retail stores in some Hong Kong multilevel shopping centers. By exploring the relationship, it tries to serve two purposes. First, it tries to apply ecology theories to explain the phenomena and hence facilitate the dynamics of two different academic categories. Second, it serves to add depth to literature and help facilitate further studies related to multilevel shopping centers in Hong Kong. It is hoped that the results of this study can give useful insights to mall planners and developers about the natural occurring space-level relationship in shopping centers.

[8] The balance of tenants selected to operate in a shopping center.

1.2 Objectives

To conclude, there are four objectives in this dissertation.

- To find out the relationship between floor levels and store unit size with reference to some multilevel shopping centers in Hong Kong
- To provide a scientific explanation to the above phenomena with the use of ecology concepts
- To formulate some tenant placement and space allocation guidance with reference to multilevel shopping centers in Hong Kong
- To provide empirical evidence in support of the ecological nature of retail environment in malls

1.3 Scope of the study

The aim of this study is to empirically explore the relationship between store sizes and the floor level of retail shops located at multilevel shopping centers (having seven floors or above), regional or metropolitan, in Hong Kong.

1.4 Methodology

The methodology will be divided into 3 parts.

- Literature Review

The literature review has 3 parts. First, a number of retail theories in relation to tenant placement and space allocation will be reviewed. Second, some basic ecology theories will be discussed. Finally, a summary in this part will be provided to link up the two categories of theories with reference to some previous studies.

- Data Collection

In this part, reasons for choosing the respective data will first be discussed. Secondly, how the data is collected from a number of multilevel shopping centers in Hong Kong will be presented accordingly. Afterwards, potential factors which will affect the result of this dissertation will be figured out with suggested solutions. Then, a primary analysis of the data will be conducted. Finally, a multiple regression model will be introduced.

- Empirical Test

After the analysis of data, an empirical test using multiple regression analyses will be

conducted. Ecology theories will be used to explain the regression result. An in-depth discussion will be provided to explain the applicability of ecology theories into shopping center industry with reference to the relationship between store unit size and floor level in Hong Kong multilevel shopping centers.

1.5 Overview of the study

There are in total 8 chapters in this dissertation.

The first chapter provides the background information of the topic including the objectives of the study, the scope of the study, the methodology framework and the overview of the study.

Chapter 2 provides an in-depth literature review including some retail theories and ecology theories. Retail theories with regard to tenant placement and space allocation are examined in detail. Some of the ecology theories will be discussed and the analogy with shopping center industry will be provided.

In Chapter 3, the definition of shopping center and a classification of shopping centers in Hong Kong will be provided.

The hypothesis and deduction are stated in Chapter 4. Besides, the methodology for the empirical model is explained in details. Relevant statistical tests are introduced.

Data analysis and interpretation are demonstrated in Chapter 5 towards the data collected from some of the multilevel shopping centers in Hong Kong, namely Times Square in Causeway Bay, Langham Place in Mongkok and Grand Century Place in Prince Edward. Store unit size data will be grouped by different types of businesses and they will be discussed group by group.

In Chapter 6, the empirical model is presented and the result from the regression analysis is given with detailed interpretations. Results from statistical tests are presented.

In Chapter 7, finally, an in-depth discussion on the implications of the study, the limitations of the study and the recommendations for further studies will be discussed. A summary of findings will also be provided.

Finally, a conclusion will be given in Chapter 8.

2. Literature Review

This dissertation aims at finding out the relationship between floor level and store unit size of multilevel shopping centers in Hong Kong. Related studies like tenant placement and space allocation of shopping mall will be reviewed in this chapter. This chapter consists of three parts: in-depth review of retail theories; certain ecology concepts; and a summary of the chapter.

2.1. The Ecosystem in Shopping Centers

Considering the retailing environment as an ecosystem is no longer a new idea. Pioneer works can trace back to Cha's work (2001) which described retailers and shoppers 'continuously breed, were born, adjusted, mutated, aged and died'. The shoppers visiting shops look for the goods they desire 'with senses heightened like animals searching the land for sustenance' (Cha, T. W., 2001).Furthermore, Underhill (2004) regarded shopping malls as living creatures with a 'shopping mall's DNA'. Recently, Yiu and Yau (2006) considered shopping malls as "ecosystems for predators and prey to coexist and prosper".

The ecosystem in shopping centers refers to the ecological environment in which

shoppers, retailers and mall operators co-exist and predator-prey interactions take place between them. It describes, using ecology concepts, the interdependency of the three stakeholders of a shopping mall. P. Coleman (2006) shares the same view by emphasizing the success of a shopping development depends on the requirements of all three stakeholders being equally met and balanced. There is fundamental interrelationship and dependency between the developers/owners, tenants and customers with no single stakeholder's requirements being met at the expense of another's.

For example, the developer/owner needs tenants to occupy the accommodation; pay the rental income and service charge in order to cover the development and running costs; and attracts the customers to use the center and justify the charges to the tenants. The tenants need customers to purchases goods from their stores to operate their business while the owner has to provide an attractive retail mix, a convenient memorable environment, good customer facilities and ease of access to attract customers and to encourage their return. The customers benefit from the shopping center facilities of the owner, and require the retail goods of the tenants.

Further, Yiu and Yau (2006) successfully formulated an ecological framework to model the dynamic interaction among shoppers, retailers, other competing malls and

shops-on-street using the concept of community ecology. The retailing environment in a shopping mall is analogized to an ecosystem in which predators and prey coexist. The analogy is shown in Table 1.

Table 1: An analogy between retailing and ecological systems

Retailing market	Eco-system
Shopping malls	Carnivores (predators of retailers)
Retailers	Herbivores(prey for malls/predators of shoppers)
Shoppers	Producers (preys for retailers/consumers of food provided by malls)
Retailing environment of a mall	Community
Retailing network	Eco-system

(Yiu, C.Y., Yau, Y., 2006)

In the framework, as shown in Figure 1, shopping malls prey on retailers through retail space leasing. The food or sustenance in a mall is money. Retailers, on the other hand, prey on shoppers by selling goods and services. The major difference between shops in the street and shopping malls lies in the curved arrow as shown in Figure 1. A mall provides food (utilities) to shoppers by different positioning strategies, which in turn attracts retailers to the field. These utilities (e.g. providing a pleasant

environment) are not necessarily there, but they have to be made available by the mall operator. Therefore, the three stakeholders form a very interesting symbolic relationship which results in a dynamic equilibrium of the ecosystem.

Figure 1: Relationship between different components in a retailing environment

(Yiu, C.Y., Yau, Y., 2006)

Based on the analogy, Yiu and Yau (2006) proposed an eco-metaphor of the mall positioning strategy, as shown in Figure 2. The strategy is underpinned by two objectives that:

(1) the prey maximizes their utilities obtained; and

(2) the predators have as much prey as possible.

The first objective can be achieved in a number of ways. For instance, retailers can maximize their utilities by choosing a mall with the lowest rent and the best pedestrian flow. On the other hand, shoppers can be benefited from comparison shopping, savings in transportation costs and possible enjoyment of the mall facilities. Similarly, mall operators can maximize their utilities by enjoying the financial stability of rental income.

In order to achieve the second objective, mall operators aim at (1) attracting more preys (shoppers) for the retailers and, (2) controlling the competition among retailers. The first aim can be achieved by good architectural design, promotional activities and effective property management. The second aim can be realized by limiting the number of competitors and composing a harmonious mix of retailers. However, the abundance and quality of prey is usually predetermined by the location of the mall due to demographical differences.

Based on the objectives, Yiu and Yau (2006) also proposed six major determinants of a successful mall positioning strategy. They are *Location, Architectural Design, Leasing Strategy, Promotional Activities, Property Management and Terms of Tenancy.*

They are described as the ‘genetic codes’ of the shopping center. Each genetic code is composed of three elements, as shown in a 6x3 matrix in Figure 2.

Theoretically, the matrix applies to every shopping mall worldwide. However, shopping centers are unique in nature. It is impossible to describe endlessly all combinations of characteristics of every shopping mall. Hence, variations of these genetic codes are responsible for the unique characteristics, and consequently the success or failure, of a mall.

In this dissertation, one should focus on multilevel shopping centers in Hong Kong in which floor levels might be one of the important variations for the genetic code – Architectural Design.

Figure 2: A6x3 matrix of factors determining the success of a mall positioning strategy

(Yiu, C.Y., Yau, Y., 2006)

2.2. Space Allocation in Shopping Centers

In tall buildings, the share of floor space for commercial use is determined by allocations based on demand of space for particular uses (C. Irazabal & S. Chakravarty, 2007). Space allocation within a shopping center refers to the way by which retail spaces are distributed to different categories of shops with the aim of sales/profit maximization of the shopping center. The optimal size of a retail shop depends on the balance between operating costs and floor space requirements (Sim, L.L., 1984). Thus, business type such as electric, restaurants and clothing requiring larger floor area have expanded in size while those selling beauty products, jewelry and watches have become smaller in size but grown in number to meet greater consumer demand (Sim, L.L., 1984). Often, issues concerning space allocation, tenant mix and tenant placement in a shopping center are inter-related and should be considered together. However, most of the research papers indeed refer only to the relationship between space allocation and rent/profit issues contrasting to the inadequate academic support in relation to tenant placement or positioning issues.

Knowledge related to space allocation within a shopping center had not been well established until the works of Brueckner in 1993. In his work, he demonstrated that there are both anchor and non-anchor demand externalities. Hence, the mall owners maximize their profit by allocating space to various types of tenants. Following his line of thought, Eppli and Shilling (1993) suggested that the landlord must choose the optimal allocation of space to the shop categories to maximize total center rental. The allocation is based on the volume of sales per square meter of retail space. In 1998, Miceli, Sirmans and Stake further explained the phenomena by showing that profit maximizing developers may allow within-center competition as the presence of

shopping externalities and increased customer traffic can increase the center's overall profit. Chiu and Yau (2007) also studied the public floor space in shopping centers and showed that the annualized rental incomes of the centers increase at a decreasing rate with the ratios of public floor space to retail floor space in the centers. There is an optimal upper limit for the ratio of 1.32. The economic importance of space allocation in shopping centers has been successfully implied in the previous literatures.

Although there are a number of studies concerning space allocation in shopping center, none of them is related to the tenant placement issue. The space-position relationship of retail stores has never been addressed in previous literature, despite the close relationship between space allocation, tenant mix and tenant placement. In light of this, this dissertation aims at adding depth to the literatures and providing some insights to the issue by empirically studying the relationship between the stores size and its floor level, followed by logical explanations.

2.3. Tenant Placement

In Sim and Cheok's work (1989), it was claimed that appropriate tenant mix determines the success or failure of a shopping center and a tenant placement is always vital in influencing the center circulation. The mall managers have to maintain a balanced distribution of customer flow by generating sales of tenants in different parts of the shopping arcade. Obviously, if the shopping center has a higher turnover of customers, the tenants will tend to be successful and so will be the higher bargaining power of the mall operators to increase the rent.

2.3.1. Objectives of tenant placement

In Dawson (1983) and Casazzs and Spink (1985)'s work, it is the mall managers' strategy to locate tenants to achieve maximum interaction among different tenants. Besides, other strategies include the promotion of customer circulation and assurance of the optimal location features of different tenants (Sim and Cheok, 1989). Moreover, the strategies can be applied in the mall by improving goods and services to stimulate impulse shopping. (Alexander and Muhlebach 1990)

2.3.2. Principles of tenant placement

The location advantageous to some kinds of businesses may not be suitable for other kinds and so many other factors have to be considered (Casazza & Spink, 1985). Abratt *et al* (1985) also commented in some poor location of the shpping center, some business can still be successful while some in a better location can run out of business because of the different location features. Casazza and Spink (1985) points out the tenant placement can follow 'mix' or 'match' principles that the sustainability of customers' interest can be maintained and can be attracted to the center. Similarly, Alexander and Muhlebach (1992) elaborated on the 'mix and match' principle that the mall can group same kind of tenants for cross-shopping while it can place different tenants together so that shoppers can experience different retail shops during shopping.

Indeed, many theories can be applied in the explanation of tenant placement but some aspects are highlighted in the work of Casazza and Spink (1985): whether the tenant is suitable or able to rent for the location; the tenants' individual preferences; the compatible role of different tenant shops; parking demand; and whether the shops are

located to the convenience of customers.

The Urban Land Institute (1999) also stated some principles for the placement of anchor and non-anchor tenants. Brown (1992) then set some rules for planning tenant placement, e.g. to put the anchor shop at the end of the entrance while the small shops are placed in the way between the entrance and anchor shop; to increase customer flow by ensuring sufficient distance between the anchor shop and entrance; to avoid the dead-end spots; and to place servicing tenants (e.g. banking) at the side malls near the entrances.

One more point to note is that most customers concentrate their movement in a small area of the shopping center and they will rarely visit both anchor stores in a center if there is more than one magnet shop (Brown, 1992). Based on the founding, Brown (1992) continued that low impulse trade is better placed in secondary location while high impulse trade should be placed in better location with higher pedestrian flow. As Nelson (1958) commented, low impulse trades are of high planned demand and 'generative' business for customers has the demand to buy from the shops in advance. Examples include 'anchor tenants, satellite tenants (secondary anchor tenant) and most service tenants' (Nelson 1958). In contrast, high impulse trades are of low planned demand but high unplanned demand, i.e. the customers do not want to buy things in advance, so they need better location to sustain their business. Echoed by Sim and Cheok (1989), examples of high impulse trades are clothes, fashion boutiques, gift and toy shops, etc. and they require high pedestrian flow and better location to maintain their business

2.4. Ecology Concepts

2.4.1. Ecology

Ecology is a term developed by a German scientist Ernst Haeckel in 1866 and is defined as "the comprehensive science of the relationship of the organism to the environment" (Frodin, D.G., 2001) Eugenious Warming, a Danish botanist, developed a work on ecology and became known as the 'founder of ecology'.

Ecology is the scientific study of the living organisms and their environment which refers to both the abiotic factors such as sunlight, precipitation, soil, pH value, etc and biotic factors such as parasites, disease, etc.[9]

2.4.2. Abiotic and Biotic Components

The biological term of abiotic components refer to the 'non-living chemical and physical factors in the environment'.[10] Examples are light intensity, temperature or weather changes, rainfall or humidity, atmospheric gases, soil type. pH value, etc.

Biotic components refer to 'all the living things or their materials that directly or indirectly affect an organism in its environment'.[11] This includes animals which consume the organism and the living food that the organism consumes. They may exist inside, become the part or be the waste of the organisms. Examples include parasites, diseases, and predation.

---

[9] *See* Wikipedia, *Ecology*, http://en.wikipedia.org/wiki/Ecology (as of Mar. 31, 2008, 16:25 GMT)
[10] *See* Wikipedia, *Abiotic components*, http://en.wikipedia.org/wiki/Abiotic_components (as of Mar. 31, 2008, 16:31 GMT).
[11] *See* Wikipedia, *Biotic factor*, http://en.wikipedia.org/wiki/Biotic_factor (as of Mar. 31, 2008, 16:35 GMT).

2.4.3. Community Ecology

Community ecology is an idea developed under the broader concept of ecology with the emphasis on the distribution, demographic characteristics and interactions among the existing populations in the ecosystem.[12] The genotype and phenotype which determines the interaction of all living and non-living organisms in the ecosystem are the major emphasis of the study in community ecology.

Genotype is a genetic makeup and is the special characteristics of an individual that may not be manifested in an observable condition but is innate in the individual.[13] A phenotype refers to the observable characteristics of organisms, like their morphology, physical appearance, developmental changes or behaviors which are all hidden in genotype.[14] The relationship between genotype and phenotype can be understood as phenotype being the manifestation of the interaction between genotype and the environment.

2.4.4. Predation or Predator – Prey Interactions

In ecological term, "predation describes a biological interaction where a predator organism feeds on another living organism or organisms known as prey". (Begon, M., Townsend, C., Harper, J., 1996)

---

[12] *See* Wikipedia, *Community ecology*, http://en.wikipedia.org/wiki/Community_ecology (as of Mar. 31, 2008, 16:43 GMT).
[13] *See* Wikipedia, *Genotype*, http://en.wikipedia.org/wiki/Genotype (as of Mar. 31, 2008, 16:47 GMT).
[14] *See* Wikipedia, *Phenotype*, http://en.wikipedia.org/wiki/Phenotype (as of Mar. 31, 2008, 16:53 GMT).

2.4.5. Natural Selection

Natural selection is a modern term developed in the field of biology by Charles Darwin in his famous work of *'The Origin of Species'* in 1859.[15] Natural selection is defined as:

> *"the pocess by which forms of life having traits that better enable them to adapt to specific environmental pressures, as predators, changes in climate, or competition for food or mates, will tend to survive and reproduce in greater numbers than others of their kind, thus ensuring the perpetuation of those favorable traits in succeeding generations"*[16]

2.4.6. Ecosystem

An ecosystem is the functional interaction between plants, animals and micro-organisms, which can be collectively known as biotic factors, and the natural environment with different non-living physical and chemical factors of the environment, which refer to the abiotic factors as described. (Christopherson, R.W., 1997)

[15] *See* Wikipedia, *Natural selection*, http://en.wikipedia.org/wiki/Natural_selection (as of Apr. 2, 2008, 22:23 GMT).
[16] *See Dictionary.com Unabridged (v 1.1)*, *Natural selection*, http://dictionary.reference.com/browse/natural selection (as of Apr. 2, 2008, 22:23 GMT).

Table 2: Summary of Literature Review

The Ecosystem in Shopping Centers			
Title	Source	Author / Year	Summary
Mall Retail-geography – An Empirical Study of Tenant Mix – Area Relationship	Working Paper, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong.	Yiu, C.Y., Yau, Y. and Li, N. (2007)	Similar to findings in biogeography, the tenant mix-area relationship follows a power law of exponent of 0.36. This implies that the species-area relationship is a natural phenomenon under certain external constraints that may not be able to be changed artificially.
An Ecological Framework for the Strategic Positioning of a Shopping Mall	Journal of Retail & Leisure Property, 5(4), 270-280.	Yiu, C.Y., Yau, Y. (2006)	This study formulates a framework to model the dynamic interaction among shoppers, retailers, other competing malls and also shops-on-street by using the concept of community ecology. The retail environment in a shopping mall is analogized to an ecosystem in which predators and prey coexist.
A Quantitative Metric of Tenant Mix – Retaildiversity of Malls in Hong Kong	Working Paper, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong.	Yiu, C.Y., Yau, Y. and Li, N. (2007)	This paper, adopting the biodiversity theory, develops a quantitative metric for tenant mix of shopping malls.
Call of the Mall	Simon & Schuster, New York	Underhill, P. (2004)	The author regards shopping malls as living creatures with a ‘shopping mall’s DNA’
Ecology, in Chung, C.J., Inaba, J., Koolhaas, R., Leong, S.T. & Cha, T.W. (eds)	Harvard Design School Guide to Shopping, Taschen, Köln, pp. 321-335.	Cha, T. W. (2001)	The author describes retailers and shoppers ‘continuously breed, were born, adjusted, mutated, aged and died’. The shoppers visiting shops look for the goods they desire ‘with senses heightened like animals searching the land for sustenance’
Space Allocation in Shopping Centers			
Inter-Store Externalities and Space Allocation in Shopping	Journal of Real Estate Finance and Economics, July 1993, 7,	Brueckner, J. K. (1993)	The author demonstrates that there are both anchor and non-anchor demand externalities. Hence, the mall

Centers	5-16		owners will maximize their profit by allocating space to various types of tenants.
Optimal Competition and Allocation of Space in Shopping Centers	Journal of Real Estate Research, 1998, 16, 113-26	Miceli, T. J. and Sirmans, C. F. and Stake, D. (1998)	The authors show that profit maximizing developer may allow within center competition, as the presence of shopping externalities and increased customer traffic can increase the center's overall profit.
What's a Shopping Center Worth?	American Real Estate Society, conference paper, 1993	Eppli, M. and J. D. Shilling (1993)	The authors suggest that the landlord must choose the optimal allocation of space to the categories to maximize total center rental. Allocation is based on the volume of sales per square meter of retail space.
A Hybrid Knowledge-Based System for Allocating Retail Space and for Other Allocation Problems	Interfaces, Vol. 18, No. 5 (1988), pp. 13-22.	Singh, M.G., R. Cook, and M. Corstjens (1988)	The authors provide a system for helping managers make various kinds of resource allocation decisions. It can compute the resource allocation decision that will maximize profits within any given set of strategic considerations. The use of the system for allocating retail space is given as an example.
A necessary evil or an income driver? A preliminary study of public space in retail facilities in Hong Kong	Journal of Retail & Leisure Property; Dec2007, Vol. 6 Issue 4, p299-309	S.M. Chiu and Y. Yau (2007)	The authors show that the annualized rental incomes of the centers increase at a decreasing rate with the ratios of public floor space to retail floor space in the centers. There is an optimal upper limit for the ratio of 1.32.
Entertainment-Retail Centers in Hong Kong and Los Angeles: Trends and Lessons.	International Planning Studies, Aug2007, Vol. 12 Issue 3, p241-271, 31p	C. Irazábal and S. Chakravarty (2007)	This paper examines the evolution and recent trends in the design of Entertainment Retail Centers (ERCs) in Los Angeles and Hong Kong.
The Effects of Store Environment on Shopping Behavior: A Critical Review	Advances in Consumer Research; 2001, Vol. 28 Issue 1, p190-197	S. Y. Lam (2001)	This paper reviews previous studies about the store environmental effects on shopping behaviors. A conceptual framework which integrates various environmental effects is first constructed.
The Determination of Rent in Shopping Centers: Some	Journal of Real Estate Literature; Jul99, Vol. 7 Issue	R.S. Tay, C.K.Lau and	The authors show that the rental rate of a retail unit is positively related to its customer-generating power and

Evidence from Hong Kong	2, p183-196	M.S.Leung (1999)	the size of the shopping center but negatively related to its own size.
Tenant Placement			
Tenant Placement in a Singapore Shopping Center	International Journal of Retailing. 4(3); pp. 4-16.	Sim, L. L. and Cheok, R. W. (1989)	The authors show that in each level of the mall, pedestrian flow declined as distance from shop to the main malls increased. Besides, they suggested that pedestrian circulation would have been improved further if the department store anchor tenants bad been located up to level 3.
Tenant Mix: the key to a successful shopping center	Quarterly Review of Marketing Vol. 10 no. 3.	Abratt R, et al. (1985)	The authors point out that different trades have different locational characteristics.
Managing and Leasing Commercial Properties	Canada: Wiley.	Alan A. Alexander and Richard F. Muhlebach (1990)	The author points out that applying a tenant placement strategy in a shopping center is to mix goods and services to encourage impulse shopping when shoppers are looking for something specific
Shopping Center Management	USA: Institute of Real Estate Management.	Alan A. Alexander and Richard F. Muhlebach (1992)	The authors point out the principal of tenant placement is to group same type of tenants together to foster cross-shopping or to spread out different tenants so that shoppers are exposed to many types of retailers during the trip.
Tenant Mix, Tenant Placement and Shopper Behaviour in a Planned Shopping Center	Service Industries Journal; Jul92, Vol. 12 Issue 3, p384-403	S. Brown (1992)	The author undertook a week-long observation study of 250 shopping groups in a suburban district center, revealing that shopper circulation tends to be limited to a small section of the mall.
Topics in Applied Geography: Shopping Center Development,	Longman Group Ltd., London.	Dawson, J.A. (1983)	The author state that tenant placement strategy is to arrange tenants in order to provide a maximum amount of interaction between each tenants
Ecology Concepts			

The Theory of Island Biogeography	Princeton, N.J.: Princeton University Press.	MacArthur, R.H. and Wilson, E.O. (1967)	They posit that “the number of species occurring on an island represents a balance between recurrent immigration of new species onto the island, and recurrent extinction of resident species”.
Experimental Zoogeography of Islands: Effects of Island Size	Ecology 57: 629-648.	Simberloff, D.S. (1976)	Found that the number of arthropods present on 8 islands decreased after islands become smaller.
Ecology, the Ascendant Perspective.	Columbia Univ. Press.	Robert Ulanowicz (1997)	The author describes community ecology as a sub-discipline of ecology which studies the distribution, abundance, demography, and interactions between coexisting populations.
Geosystems: An Introduction to Physical Geography 3rd (in english)	Upper Saddle River, NJ, USA: Prentice Hall Inc.	Christopherson, Robert W. (1997)	The author describes an ecosystem as a natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment.
Ecology (Third edition)	Blackwell Science, London	Begon, M., Townsend, C., Harper, J. (1996)	The author describes predation as a biological interaction where a predator organism feeds on another living organism or organisms known as prey.
The tropical origin of ecology: Eugen Warming’s jubilee.	Oikos 26, 240-245.	Goodland, R.J. (1975)	Founder of ecology
Guide to Standard Floras of the World	Cambridge University Press, 72	Frodin, D.G. (2001)	“[Ecology is] a term first introduced by Haeckel in 1866 as Okologie and which came into English in 1873”

3. Classification of Shopping Centers in Hong Kong

Before examining the relationship between the store size and its floor level in a mall, the definition of shopping centers and its classification are provided first. This is important as it can affect the consistency of the data base and hence the result of this study.

3.1. Definition of shopping center

According to *Shopping Center Development Handbook* published by the Urban Land Institute in 1999, a shopping center is defined as:

> *"A group of architecturally unified commercial establishments built on a site that is planned, developed, owned, and managed as an operating unit related by its location, size, and type of ships to the trade area that it serves. The unit provides on-site parking in definite relationship to the types and total size of the store."*

3.2. Shopping center classification

As the Hong Kong Planning Standards and Guidelines (the Planning Department of Hong Kong Government) defined in 1998, shopping centers can be divided according to the size, the people that it is able to serve, the existence of different shops, the presence of restaurants and other services or entertainments. Under this work, 4 types

of shopping center can be concluded: metropolitan, regional, district and local centers. The detailed description of each type of center will be elaborated in later paragraphs.

3.2.1. Metropolitan Centers

Metropolitan centers are to provide a huge number of shops to sell consumer goods, to provide banking and commercial activities, entertainment facilities like cinemas and restaurants (Planning Department of Hong Kong Government, 1998) So, they are of considerable size, with a diversity of shop types and tend to have higher accessibility to the shoppers. Most of the metropolitan centers in Hong Kong, e.g. Central, Tsim Sha Tsui and Causeway Bay, have the function of serving local consumers and foreign tourists and to provide diversified social activities.

3.2.2. Regional Centers

Regional centers usually serve for the population between 250,000 and 1,000,000. (Planning Department of Hong Kong Government, 1998) They usually provide services outside the city center but are concentrated in new towns in Hong Kong, e.g. Tsuen Wan, Sha Tin, Tai Po, Fanling/Sheung Shui, Yuen Long and Tuen Mun. The size of these regional centers may vary from 50,000 to 250,000 sq.m. internal floor area (IFA) and these regional center also provides department stores or supermarket and other supporting services like cinemas and restaurants (Planning Department of Hong Kong Government, 1998)

3.2.3. District Centers

Districts center are usually of medium scale and provide services in town or district levels which comprises of a population approximately between 50,000 and 250,000 (Planning Department of Hong Kong Government, 1998) Examples in Hong Kong can be Wan Chai which is an urban area and Kam Tin which is a rural area. The IFA for District centers have about 10,000 to 50,000 sq.m. IFA. (Planning Department of Hong Kong Government, 1998) Although they tend to have less entertaining or supporting facilities, there are still the presence of concentrated retail shops and catering facilities.

3.2.4. Local Centers

For local center, they are usually of small scale with limited catchment population of less than 50,000, e.g. those small shopping centers located in the local housing estates, including those public and private housing estates (Planning Department of Hong Kong Government, 1998) Basic retail and supporting services may be included in these local centers and the IFA may be limited and restrained to about 10,000 sq.m. (Planning Department of Hong Kong Government, 1998)

Table 3: Classification of shopping centers in Hong Kong

Types of Shopping Center	Internal Floor Area (m^2)	Catchment Population	Description
Metropolitan Centers	> 60,000	Serving Hong Kong as a whole and tourists to Hong Kong	Providing a large number of shops selling principally consumer durable goods, a wide range of banks and commercial services, a large number of cinemas, theatres and restaurants. They also provide territory-wide entertainment and social facilities
Regional Centers	27,000 to 60,000	250,000 to 1,000,000	They are shopping centers which fulfill a regional function. They are typically situated outside the Metropolitan area in the new town centers (e.g. Tsuen Wan, Sha Tin, Tai Po, Fanling/Sheung Shui, Yuen Long and Tuen Mun) They are characterized by the provision of modern department stores/supermarkets and a wide range of ancillary services, i.e. banks, restaurants, cinemas, theatres and other social facilities.
District Centers	10,000 to 27,000	50,000 to 250,000	These are the medium-scale shopping centers of town-wide or district significance. (e.g. Wan Chai in the urban area and Kam Tin in the rural area) They support limited entertainment and social facilities but contain significant concentrations of retail facilities and restaurants.
Local Centers	Less than 10,000	Less than 50,000	These are small-scale shopping centers with concentrated shops which serve a localized catchment population (e.g. Fung Tak Estate and Tai Yuen Estate), and support local retail services and restaurant establishments.

Source: Hong Kong Planning Standard and Guidelines, National Research Bureau (NRB) Online.

4. Hypothesis and Methodology

4.1. Hypothesis Statement

The hypothesis in the study is that retail stores located at a higher level of a multilevel shopping center tend to occupy a larger floor area.

4.2. Hypothesis deduction

The hypothesis statement is deduced from two different perspectives. Firstly, it is deduced from an ecological point of view considering shopping mall as an ecosystem. Secondly, another explanation will be provided from the perspective of mall managers.

4.2.1. Ecological perspectives

The deduction of shopping mall as an ecosystem consists of a series of predator-prey interactions among malls, retailers and shoppers. Following the line of thought that mall activities are ecological, it is arguable that other ecology theories could be applied to explain mall phenomena.

In ecology, an organism's environment may be distinguished by abiotic components and biotic components. To arrive at an appropriate analogy between a retailing network and an ecosystem, it is necessary to have a clear definition of abiotic components and biotic components of a retail store in a shopping center.

In short, the abiotic components of an organism’s environment refer to the physical components of an organism's environment. These include temperature, light, water,

nutrients, etc. The abiotic components of an environment thus have dramatic impact on the survival of organisms. Without such an environment, the organism can no longer survive. Unlike biotic components, which are largely subject to interactions and changes with other organisms, abiotic components of an organism's living environment keep rather stable and rarely change. Hence, in a shopping center, a retail store's living environment or abiotic components refer reasonably to its accessibility, which is predetermined by the location of the shop and is rarely changeable. In other words, the accessibility of a shop in a mall does not change, no matter what the tenant mix, competition or compatibility of neighboring retailer is. Generally speaking, a shop located near the entrance is expected to perform financially better than the one positioned at the dead-end. Similarly, a retail store positioned at a higher level or a basement is expected to perform poorer than the one located at the first floor of the shopping center. (Sim, L. L. & Cheok, R. W., 1989)

In contrast, biotic components of an environment refer to all the living things or their materials that directly or indirectly affect the organism. These organisms may be competing, preying upon, being preyed upon, providing shelter, or in some other ways affecting the environment. Note that these components change rapidly in an environment. Thus, in a shopping center, the biotic components of the environment in which a retail shop located refers reasonably to other non-physical components of the retail environment, which affect the survival of the organisms (retailers), directly or indirectly. These components can be competition, tenants mix, compatibility of neighboring retailers, etc. In fact, each of these components could be itself a new research area under this eco-mall discipline. However, the biotic components are not the focus of this study.

In this dissertation, the abiotic component of the retail environment of a shop in a shopping center is defined as the accessibility or the location of the retail shop. Undoubtedly, floor level is one of the main determinants of the accessibility of a retail shop in a multilevel shopping arcade. Hence, it is deducible that shops located at a higher level occupy a poorer "physical environment" or abiotic components than those positioned at a lower level in a multilevel retail complex. Ecologically, according to natural selection or 'survival of the fittest' derived from Charles Darwin, the types and numbers of organisms should decrease in such an environment. If these cases happen in a multilevel shopping mall, it means that a fewer number and types of retail shops can "survive" on a higher floor level than those on a lower level. Hence, it implies that a shop located at a higher level occupies a larger floor area than a similar shop positioned at a lower level, due to similar structural design of the shopping center.

Table 4: An analogy between ecological environment and retailing environment - abiotic and biotic components

	An organism's living environment	A retailer's business environment
Abiotic components	Sunlight, water, temperature, nutrients, etc.	Accessibility / location of the retailer's shop
Biotic components	Predation, parasitism, competition, etc.	Tenant mix, competition, compatibility of neighboring retailers, etc.

4.2.2. Mall operator's point of view

From the perspective of mall operators, it is always more difficult to lease a retail store located at the fifth floor than one located at the ground floor due to the poor

accessibility or location of the shop. Similarly, retailers always want to occupy a better location in terms of a higher pedestrian flow and/or a lower rent. It is predictable that mall operators could lose retailers on higher levels easily if the rental level is the same as other floor levels in the mall. Consequently, the mall operators have to bear the cost of searching for new retailers and it does clearly no good to the cash flow of the center. Therefore, mall operators are willing to offer a lower rent to retailers who occupy a larger space at a higher level. Previous studies partly proved this point by finding that the rental rate of a retail unit is negatively correlated to its own size (R. S. Tay, C. K. Lau and M. S. Leung, 1999). The mall owner thus benefits from saving the search cost for a replacement.

4.3. Methodology

4.3.1. Multiple regression analysis

This study aims at empirically testing the relationship between the lettable area of a retail store and the floor level at which it is located. In total, there are 13 independent variables in the model. Therefore, multiple regression analysis is used to study the relationship. The general objective of regression analysis is to model the relationship between a dependent variable and one or more independent variables. A general regression model, which relates a dependent variable y to k independent variables x_1, $x_2 \ldots x_k$ is given by the equation:

$$y = a + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + \varepsilon$$

The simplest and most common method of estimating the parameters of the regression

model is the Ordinary Least Squares (OLS) technique. It can minimize the residual sum of squares of the differences between the actual and forecast values of dependent variable.

4.3.2. Choice of functional form

The functional form of the regression equation depends on the nature of the relationship. The usual forms include linear, semi-logarithm or logarithm. In this study, functional form of the empirical models can be deduced from a prior knowledge of the relationship between dependent and independent variables. Consistent with the previous empirical studies of determinants of shopping center rent, the semi-logarithm function form is used in this study.

4.3.3. Test statistics

There are several test statistics that can be determined from the regression analysis, and the information is crucial to evaluate and interpret the empirical results.

- Coefficient of determination (R^2)

The coefficient of determination of a regression analysis indicates the proportion of variation in the dependent variable that can be explained by the variation in the independent variables. The value of R^2 must be between zero and one. The higher the value of R^2, the higher is the explanatory power of the estimated model.

- t-Statistic

The t-Statistics of the independent variables are used to test the significance of the effect of the independent variable on the dependent variable. If the t-statistic is larger than the critical value for a given significance level and degree of freedom, then the independent variable is said to be significant at a certain significant level. The larger the t-statistic, the more significant is the variable.

- F-Statistic

F-Statistic is used to test the significance of the R^2 Statistic. Also, it can also be used to test the null hypothesis that the regression coefficients are equal to zero. If it is larger than the critical value for a given significance level and degree of freedom, the null hypothesis is rejected.

5. Data and Variables

5.1. Sources of data

The lettable areas of retail shops are obtained by direct measurement from floor plans derived from the Building Department, Hong Kong Government. There are 3 shopping centers in total comprising 358 retail shops, namely Times Square (TS), Langham Place (LP), Grand Century Place (GCP). They are located at Causeway Bay (TS), Mongkok (LP) and Prince Edward (GCP) respectively. Latest plans including any alternation and addition works available at the Building Department were used. In case of any visual uncertainty on the graphs, site inspections to the shopping centers were carried out and personal judgments were involved in the data collection process.

Some criteria were considered when choosing the subject malls. First, they should be of comparable scale, i.e. only regional or metropolitan shopping centers were included. Second, they should be 'tall' enough in order to investigate the relationship between floor levels and store sizes. Third, the essential data must be available. Megabox was eliminated from this study because of insufficient data provided by the shopping center. According to these criteria, three shopping centers were shortlisted in this study.

With reference to the retail services category defined by Hong Kong Retail Management Association, all retailers in Hong Kong are classified into 10 types, including beauty products and cosmetics, catering / food, department stores, electronics and electrical appliances, fashion and accessories, furniture and home accessories, supermarkets and convenience stores, watch and jewellery, specialty shop,

and others.[17] Similar definitions were applied in this study but some amendments were made due to practical considerations. For instance, the groups "furniture and home accessories" and "entertainment and others" were not included in this study because there was no sample in the subject malls. Besides, the group "fashion and accessories" was divided into two sub-groups in the study in order to have a more balanced sample size.

5.2. Description of sample malls

- Times Square (TS)

Times Square was officially opened in April 1994 and is one of Hong Kong's largest shopping malls and one of the 10 most popular tourist destinations in Hong Kong. It is owned by Wharf Properties Ltd, leased by Harriman Leasing Ltd and managed by Times Square Ltd.[18]

The mall contains more than 190 shops, a multi-cinema complex, and state-of-the-art technology. Times Square boasts a massive 900,000 square feet of retail space, over one million square feet of grade A office space, and 700 car parking spaces on four basement levels, making it the largest car park in Causeway Bay.[19]

Times Square aims at providing total one-stop shopping and entertainment and the facilities are spread over 16 floors within Times Square. The floors are neatly and logically divided into retail, entertainment, recreational and dining areas. In Times

[17] See Hong Kong Retail Management Association [n.d.] *Membership Directory Full Members* [online] Hong Kong. Available from http://www.hkrma.org/en/membership/fullMembers.jsp

[18&18] See Timessquare [n.d.] *All about Times Square* [online] Hong Kong: Times Square. Available from http://www.timessquare.com.hk/en/module/about/index.php/ [Accessed 3 April 2008].

Square, it is a practice to divide shops into different categories and situates them onto the same level to allow convenient shopping.[20]

- Langham Place (LP)

Langham Place is a business and commercial complex of shopping mall opened in November 2004 in Hong Kong. Located in Mong Kok of Kowloon, the complex occupies two entire blocks defined by Argyle Street, Portland Street, Shantung Street and Reclamation Street.[21]

The complex was founded under the urban renewal project of Land Development Corporation, later known as Urban Renewal Authority (URA). The project was to cleanse and modernize a dilapidated area of Kowloon previously known as a red-light district, especially Portland Street.[22]

The complex has a gross floor area of 1.8 million sq. ft. housing the office tower, a 15 storey mall including 2 basements that spirals itself up to the 13th floor and a 665 room hotel. Its 100,000 square feet (10,000 m²) of retail space is configured over 15 levels, with 60,000 square feet (6,000 m²) of space from the second basement level to third floor; from the fourth floor upwards the floor area is 40,000 sq ft (4,000 m²). The rental model includes a base rent of between HK$50 and HK$300 per square feet, plus a variable component calculated based on 10 to 15% of retailers' turnover.[23]

---

[20] See Timessquare [n.d.] *All about Times Square* [online] Hong Kong, http://www.timessquare.com.hk/en/module/about/index.php/ [Accessed 3 April 2008].

[21, 21 & 22] *See* Wikipedia, *Langham Place, Hong Kong*, http://en.wikipedia.org/wiki/Langham_Place%2C_Hong_Kong [Accessed Apr. 3, 2008].

- Grand Century Place (GCP)

The seven-storey shopping mall of 720,000 sq. ft. and Royal Plaza Hotel offer a wide choice of shops, restaurants, cinema and entertainment to tenants.[24] In addition to a diverse mix of brand-name retailers and restaurants, it features recreational and leisure facilities including an eight-screen cinema and 18,000-sq.ft. children's playground. There are nearly 200 retailers, covering eight floors, and a food court which offers catering choices. It is on the top of the Mong Kok East MTR station and near the Edward Prince and Mong Kok MTR stations and a bus terminal, connected to two office towers and the Royal Plaza Hotel. It is of high accessibility with foot bridges connected to other parts of Mong Kok.[25]

5.3. Data measurement

All data were measured in terms of lettable area (LA), commonly known as gross leasable area in western countries, which is the area for which tenants pay rent; it is the area that produces income. LA has been adopted by the shopping center industry as its standard for statistical comparison and is mainly used for rental purposes. According to Code of Measuring Practice issued by The Hong Kong Institute of Surveyors in 1999:

> *"the lettable area of s unit occupying an entire floor shall be the floor area exclusively allocated to that unit including toilets and lift lobbies but excluding common areas such as staircases and smoke lobbies, lift shafts and*

[24] See Sun Hung Kai Properties [n.d.]*Grand Century Place* [online] Hong Kong. Available from http://www.shkp.com.hk/html/grand_century_place/eng/management.html [Accessed 3 April 2008].
[25] See Sun Hung Kai Properties [n.d.]*Grand Century Place* [online] Hong Kong. Available from http://www.shkp.com.hk/en/scripts/property/property_mall_gcp.php [Accessed 3 April 2008].

plant rooms."

"The lettable area of a unit which is one of several units making up an entire floor shall be the floor area exclusively allocated to that unit plus a proportionate share of the communal toilers, lift lobbies and passageways among the units on that floor such that the aggregate Lettable Areas of all subdivided units on the floor shall equal the Lettable Area of the floor if occupied as one single unit."

In practice, the floor area is calculated by the mathematical sum of a number of divided geometrical areas with definite areas calculated by standard formulas. However, the irregularity of the floor area increases the complexity of its measurement and calculation. The higher the complexity of the floor area, the more is the number of divided geometrical areas. In this dissertation, the LA measurement involves basically two processes, addition followed by subtraction. First, addition refers to the summation of a number of wanted geometrical areas. Second, the summation is subtracted by a number of unwanted geometrical areas.

External walls, structural columns and partition walls between shops were involved in the calculation and they essentially increased the complexity of the calculation. The Code of Measuring Practice (1999) does not provide a clear guideline by saying that "where the premises contain walls, columns or plinths and similar features which are of significant dimension relative to the main accommodation, these shall be separately noted." The provision is unclear in a sense that whether the columns or walls are of significant sizes is largely subject to surveyor's judgments. It is therefore necessary to establish a standard approach to calculate them. In this dissertation, external walls were excluded from the LA calculation and the dimensions were measured from the

outer surface of external walls. Structural columns were also excluded from the LA calculation. Personal judgments were always involved in dimensional measurement of non-geometrically shaped columns. So, human error always exists and is assumed to be constant throughout the study. Contrary to external walls and structural columns, partition walls were included in the calculation. The LA of the partition wall was shared by both parties and thus the dimensions were measured from the central line of the partition wall. An example of retail shop floor area measurement provided by The Hong Kong Institute of Surveyors (1999) is given in Appendix I for readers' reference.

Before the LA was obtained, the surface area calculated from the plan was multiplied by an appropriate scale of the graph. This certainly posed some errors in the calculation which could be avoided by using the original graph with an accurate scale. However, due to the financial limitation of this study, the current method was used instead.

5.4.Selection of variables

The aim of this dissertation is to examine the relationship between the lettable area of a retail store and its floor level in a multilevel shopping center in Hong Kong. Since no prior studies were conducted in this area, the selection of variables based mainly on personal judgments and observations. There are 15 variables in total. It is true that the inclusion of more variables may increase the explanatory power of the empirical models. However, this will lead to an increase in the complexity of the analysis as well (Mason & Quigley, 1996). Therefore, there is a trade-off to incorporate the

relevant variables in the models. The following table shows the list of variables used in the models and their corresponding explanations.

Table 5: Selection of variables

Variables	**Unit of Measure**	**Descriptions**
Dependent Variable		
Lettable Area (LA)	m^2	Lettable Area of the shop in the shopping center
Independent Variables		
Types of Businesses		
Supermarket (TB_S)	dummy	TB_S = 1 if the shop is a supermarket, zero otherwise
Restaurant (TB_R)	dummy	TB_R = 1 if the shop is a restaurant, zero otherwise
Clothing (TB_C)	dummy	TB_C = 1 if the shop is a clothing store, zero otherwise
Children's Products (TB_CP)	dummy	TB_CP = 1 if the shop sells children's products, zero otherwise
Accessories (TB_A)	dummy	TB_A = 1 if the shop sells accessories, zero otherwise
Beauty and Care (TB_BC)	dummy	TB_BC = 1 if the shop is a beauty and care store, zero otherwise
Electronics (TB_E)	dummy	TB_E = 1 if the shop is an electronics store, zero otherwise
Gifts / Stationary (TB_GS)	dummy	TB_GS = 1 if the shop is a gifts / stationary store, zero otherwise
Jewelry / Watches (TB_JW)	dummy	TB_JW = 1 if the shop is a jewelry / watches store, zero otherwise
Books (TB_B)	dummy	TB_B = 1 if the shop is a book store, zero otherwise
Location		
Times Square (TS)	dummy	TS = 1 if the shop is located at Times Square, zero otherwise
Langham Place (LP)	dummy	LP = 1 if the shop is located at Langham Place, zero otherwise
Grand Century Place (GCP)	dummy	NCP = 1 if the shop is located at New Century Place, zero otherwise
Proxy for Hypothesis		
Floor Level (FL)	Positive integers	Floor level of the shop in the shopping center

5.4.1. Dependent Variable - LA

According to Code of Measuring Practice issued by The Hong Kong Institute of Surveyors in 1999,

> *"the lettable area of a unit occupying an entire floor shall be the floor area exclusively allocated to that unit including toilets and lift lobbies but excluding common areas such as staircases and smoke lobbies, lift shafts and plant rooms."*

> *"The lettable area of a unit which is one of several units making up an entire floor shall be the floor area exclusively allocated to that unit plus a proportionate share of the communal toilers, lift lobbies and passageways among the units on that floor such that the aggregate lettable areas of all subdivided units on the floor shall equal the lettable area of the floor if occupied as one single unit."*

5.4.2. Independent Variables

The independent variables used in the empirical model can be classified into business type attributes and location attributes. There are in total 14 independent variables selected and they are described below respectively.

A set of dummy variables were included in the business type attributes. Retail shops were grouped according to their types of businesses. It is clearly enough that the average store size of a retail shop largely depends on its business type. For example, an ordinary size restaurant should be larger than an ordinary size jewelry shop.

Therefore, with reference to the retail services category defined by Hong Kong Retail Management Association[26], a number of business type attributes were included in the set of variables including supermarket (TB_S), restaurant (TB_R), clothing (TB_C), children's product (TB_CP), accessories (TB_A), beauty and care product (TB_BC), electronics (TB_E), jewelry and watch (TB_JW), gifts and stationary (TB_GS) and books (TB_B). Further descriptions for each attribute are provided below.

- Supermarket (TB_S)

Supermarkets usually occupy a large area in shopping malls. In this dissertation, department stores are included in this category. Department stores and supermarkets are often known as the main generators of customer traffic.

- Restaurant (TB_R)

According to Beyard, M.D., O'Mara, W. P., et al., (1999):

> "*…virtually all shopping centers provide some form of eating facilities … Restaurants vary greatly as to classification and type of operation. They may be independently owned or part of a national chain. They may range from the small, quick-order, limited-menu counter service to the distinctively decorated, destination-quality establishment providing table service*."

They are commonly found in shopping centers and they usually occupy a large amount of LA. The inclusion of restaurant in shopping malls successfully lengths the

[26] See Hong Kong Retail Management Association [n.d.] *Membership Directory Full Members* [online] Hong Kong. Available from http://www.hkrma.org/en/membership/fullMembers.jsp [Accessed 7 April, 2008]

time shoppers spend on the mall. (Coleman, P., 2006) In this study, the group 'restaurant' means to include all fast-food restaurants as well as ordinary restaurants with different styles of cuisine. Food courts are exempted from this study.

- Clothing (TB_C)

As Beyard, M.D., O'Mara, W. P., et al., (1999) commented,

> *"Tenants in the apparel category cover a wide range of store types, quality, style, and price points. Independent merchants, local chains, national chains, and custom clothing shops are all part of the mix."*

Retail stores selling fashion clothing are a major type of shops in shopping centers and they occupy a long range of store sizes depending on their respective business scale.

Beyand, O'Mara, et al., (1999) further explained,

> *"except for anchor tenants, apparel stores typically represent the largest proportion of space in community, regional, and super regional centers …. And developers look for apparel chains and specialty apparel stores with the highest productivity in terms of store area, sales, and rents."*

In this dissertation, this group of data embraces a variety of clothing which includes sportswear, underwear, ladies' and men's fashion and casual wear. However, child wear is not included in this group.

- Children’s Product (TB_CP)

This is a minor type of business in shopping centers and not all malls have retail shops selling children’s products. In this study, this group of data basically comprises of shops selling child wear and toys.

- Accessories (TB_A)

Similar to Clothing (TB_C), retail shops selling accessories are a major type of business and occupy a large portion of LA in malls. The definition of ‘accessories’ is wide enough to cover things like handbags, shoes, leather goods and optical products. Jewelry and watches are exempted from this definition.

- Beauty and Care Product (TB_BC)

Although this type of shops is commonly found in a shopping center, they usually occupy a small LA.

- Electronics (TB_E)

The inclusion of this type of business aims at providing a balanced mix of tenants within the mall.

- Jewelry and Watch (TB_JW)

Similar to Beauty and Care Product (TB_BC), this type of shops usually occupy a small LA despite that they are easily found in a shopping center. In addition, this type of shops generates sales per square foot which are among the highest of all tenants. (Beyard, M.D., O'Mara, W. P., et al., 1999)

- Gifts and Stationary (TB_GS)

As Beyard, M.D., O'Mara, W. P., et al., (1999) defined,

> *"this category is one of the most dynamic and rapidly changing of the major tenant categories … Although not among the most frequently found tenant, they nevertheless are visited more often by shopping center customers than most other tenant types."*

This group of data consists of a wide range of retail shops including products like crystals, CDs and stationary. Every year, additional types are added to this category based on the findings of *Dollars & Cents of Shopping Centers.*

- Book Stores (TB_B)

The inclusion of this type of business aims at providing a balanced mix of tenants within the mall. They usually occupy a very large LA in a mall.

- Location Attributes

Similar to business type attributes, 3 dummy variables were set in the location attributes. The use of location attributes was intended to control the effect of different managerial styles in different shopping centers. It is logically deducible that different managers would adopt different managerial strategies and prefer different store sizes in his/her shopping mall. In this dissertation, data were extracted from 3 shopping centers in Hong Kong. They are Times Square (TS) Causeway Bay, Langham Place (LP) in Mongkok and Grand Century Place (GCP) in Prince Edward.

5.5. Expected signs of variables

Details of each independent variable have been explained in the previous section. Their expected signs and corresponding reasons will be discussed in this section.

- Business Type Attributes

10 dummy variables are used in the model to divide the data base into different groups according to different types of business. They include a broad range of business that basically covers all the retail stores in an ordinary shopping mall. The use of dummies aims at controlling factors that may affect the result of this study. As the focus of this study is the relationship between retail store sizes and floor levels, these dummy variables are used to capture the effect on the lettable area of retail shops due to their differences in business types. The expected signs are preliminarily based on the nature of the business. Businesses like restaurants, supermarket or department stores are expected to occupy a larger lettable area and hence a larger coefficient relatively.

- Location Attributes

3 dummy variables are used in the model to divide the data base into different groups according to different locations. They are Times Square (TS) in Causeway Bay, Grand Century Place (GCP) in Prince Edward and Langhom Place (LP) in Mong Kok. The use of dummies aims at controlling any locational factors that may affect the result of this study. As the focus of this study is the relationship between retail store sizes and floor levels, these dummy variables are used to capture the effect on the lettable area of retail shops due to their differences in business types. The expected signs and magnitude of coefficients are preliminarily based on a number of factors, including the site area of the shopping center and the managerial differences between centers.

- Proxy for Hypothesis

Floor level is used as a proxy for the hypothesis of this study and is expected to have a positive sign. The higher level at which a shop is located, the larger is the lettable area it occupies. According to the hypothesis, the reason is twofold. From the ecological point of view, a shop located at a higher level suffers from a weaker accessibility or a poorer ‘living environment’ than the one located at a lower floor. The number of ‘species’ or shops decreases according to ecological predictions. Hence, under similar structural design of the shopping center, floor areas of retail shops should increase. From the perspective of mall operators, it is always more difficult to let a retail store located at the fifth floor than one located at the ground floor due to the poor accessibility of the shop. Therefore, mall operators are willing to offer a lower rent to retailers who occupy a larger space on a higher level. The mall owner thus benefits from saving the searching cost for a new replacement retailer.

6. Empirical Model and Result

This chapter presents the empirical model and interprets the results. Section 6.1 describes the empirical models used in the study. Section 6.2 gives the summary of the group descriptive statistics of the variables in the model. Section 6.3 includes discussion on each independent variable.

6.1. Empirical Model

Empirical test of the hypothesis (the higher floor level at which the retail shop is located, the larger the lettable area it occupies) can be done by a regression analysis on the lettable area of retail shops in shopping centers against a number of independent variables:

LA = f (L, T, H)

Where

LA = the lettable area of the retail shop in the shopping center

L = a set of location variables including

1. No. of shops of the mall
2. total retail area of the mall

T = a set of dummies for controlling the effect on the LA due to their differences in business nature

H = a proxy for hypothesis; the floor level of the retail shop in the shopping center

Hence, the empirical models are constructed as:

$$LA = a_0 + a_1 TB\_S + a_2 TB\_R + a_3 TB\_\_C + a_4 TB\_CP + a_5 TB\_A + a_6 TB\_BC + a_7 TB\_E + a_8 TB\_GS + a_9 TB\_JW + a_{10} TB\_B + a_{11} GCP + a_{12} LP + a_{13} TS + a_{14} FL + \varepsilon$$

Where ε is the error term; and

a_i are the coefficients of the intercepts and the corresponding independent variables.

After processing the data by the computer statistical software, Eviews 5.1, the regression results are generated.

6.2. Statistics Descriptions

The data includes 358 retail stores observations, and the data are summarized as follow. Appendix II shows the data base of the empirical model.

Table 6: Descriptive statistics

Continuous Variables	Mean	Standard Deviation	Maximum	Minimum
FL	4.65	3.09	14	1
LA	157.06	327.25	3766.10	3.80
A	73910.61	11297.50	90000	60000
N	187.87	14.47	197	164
No. of Observations = 358				

Table 7: Dummy variables

Dummy Variables	Number of Records	Dummy Variables	Number of Records
Type of Business		Location Attributes	
TB_S	7	GCP	160
TB_R	54	TS	102
TB_C	125	LP	96
TB_CP	23	Total = 358	
TB_A	49		
TB_BC	39		
TB_E	8		
TB_GS	26		
TB_JW	25		
TB_B	2		
Total = 358			

From Table 6, the average floor level of the sample base is 4.65, with a range of 1/F to 14/F. The mean lettable area of the sample base is 157.06 m^2, with a wide range of 3.8 m^2 to 3766.1 m^2. The average total retail area of a shopping mall is 73910.61 m^2, ranging from 60,000 m^2 to 90,000 m^2. The mean number of shops in a mall is 187.87, with a range of 164 to 197. Table 7 shows the number of records in each type of dummy variables, business type dummies and location dummies. There are in total 358 records. Appendix II shows the data base of this model.

6.3. Statistics Tests

- Heteroscedasticity

The problem of heteroscedasticity stems from the differences of variance of the error terms in the empirical model. It means the variance of the error terms is not constant which contradicts the assumption of classical linear regressions.

There are a number of causes that give rise to the problem of heteroscedasticity. Firstly, some data may be measured more accurately than the others. Secondly, variance of the error term correlates with one of the independent variable. Thirdly, effects of certain independent variable are not taken into account. Finally, the mis-specification of the functional form may also be one of the causes.

There are basically three consequences of heteroscedasticity. First, the estimated standard error of coefficients and the error term are biased and inefficient. Second, standard t-test and therefore method of construction of confidence interval of forecast may not be applicable. However, the coefficients of variables are still unbiased and consistent.

In order to address possible heteroscedasticity in the model, White's test is performed. It is found that the model does not have the problem of heteroscedasticity.

- Multicollinearity

Multicollinearity refers to the situation that two or more independent variables are

highly correlated with each other. It means that the effect on the dependent variable due to one independent variable is similar to the effect due to another independent variable.

There are a number of consequences of multicollinearity. Firstly, the standard error of coefficients may be overestimated. Secondly, t-statistics may be under-estimated and hence t-test is not applicable. Finally, coefficients of variables may be difficult to interpret.

A correlation matrix (Table 8) is generated to examine the existence of multicollinearity. According to the matrix, it is found that the model does not present the problem of multicollinearity, as no pair of independent variables having a correlation higher than the absolute value of 0.57.

Table 8: Correlation Matrix

	LA	TS	TB_S	TB_R	TB_JW	TB_GS	TB_E	TB_CP	TB_C	TB_BC	TB_B	TB_A	LP	GCP	FL
LA	1.000000	0.096521	0.425693	0.308594	-0.103140	-0.091139	0.002717	-0.074874	-0.077870	-0.117399	0.128821	-0.131040	-0.134596	0.032300	0.141261
TS	0.096521	1.000000	0.017225	-0.006665	-0.027266	-0.033570	0.158627	0.011280	0.017986	-0.121395	0.035716	0.054718	-0.382089	-0.567424	0.488911
TB_S	0.425693	0.017225	1.000000	-0.067681	-0.044000	-0.044939	-0.020966	-0.042078	-0.117621	-0.056149	-0.012036	-0.063948	-0.056929	0.035087	-0.091255
TB_R	0.308594	-0.006665	-0.067681	1.000000	-0.115480	-0.117945	-0.055026	-0.110434	-0.308700	-0.147366	-0.031590	-0.167834	0.026772	-0.017803	0.215038
TB_JW	-0.103140	-0.027266	-0.044000	-0.115480	1.000000	-0.076677	-0.035773	-0.071794	-0.200690	-0.095804	-0.020537	-0.109111	-0.116376	0.128449	-0.213226
TB_GS	-0.091139	-0.033570	-0.044939	-0.117945	-0.076677	1.000000	-0.036536	-0.073326	-0.204972	-0.097849	-0.020975	-0.111439	-0.047914	0.073171	0.070426
TB_E	0.002717	0.158627	-0.020966	-0.055026	-0.035773	-0.036536	1.000000	-0.034209	-0.095627	-0.045650	-0.009786	-0.051990	-0.079030	-0.073596	0.162829
TB_CP	-0.074874	0.011280	-0.042078	-0.110434	-0.071794	-0.073326	-0.034209	1.000000	-0.191919	-0.091618	-0.019640	-0.104342	-0.158609	0.131084	0.100107
TB_C	-0.077870	0.017986	-0.117621	-0.308700	-0.200690	-0.204972	-0.095627	-0.191919	1.000000	-0.256103	-0.054899	-0.291673	0.098944	-0.104492	0.034776
TB_BC	-0.117399	-0.121395	-0.056149	-0.147366	-0.095804	-0.097849	-0.045650	-0.091618	-0.256103	1.000000	-0.026208	-0.139237	0.152633	-0.025790	-0.276045
TB_B	0.128821	0.035716	-0.012036	-0.031590	-0.020537	-0.020975	-0.009786	-0.019640	-0.054899	-0.026208	1.000000	-0.029848	-0.045371	0.008001	0.032853
TB_A	-0.131040	0.054718	-0.063948	-0.167834	-0.109111	-0.111439	-0.051990	-0.104342	-0.291673	-0.139237	-0.029848	1.000000	-0.002562	-0.047394	-0.014770
LP	-0.134596	-0.382089	-0.056929	0.026772	-0.116376	-0.047914	-0.079030	-0.158609	0.098944	0.152633	-0.045371	-0.002562	1.000000	-0.544142	0.169440
GCP	0.032300	-0.567424	0.035087	-0.017803	0.128449	0.073171	-0.073596	0.131084	-0.104492	-0.025790	0.008001	-0.047394	-0.544142	1.000000	-0.594848
FL	0.141261	0.488911	-0.091255	0.215038	-0.213226	0.070426	0.162829	0.100107	0.034776	-0.276045	0.032853	-0.014770	0.169440	-0.594848	1.000000

- Auto-correlation

Auto-correlation, also known as aerial correlation, refers to the situation in which error terms of the observations are correlated. It means the error terms different observations are not independent to each other and therefore contradicts to the assumption of classical linear regressions.

There are fundamentally two sources of auto-correlation. Firstly, it happens most likely in time series data. Secondly, it may sometimes result from mis-specifications of the functional form.

In case of positive auto-correlation, the standard error of the coefficients will be biased downward and therefore the calculated t-value is larger than the actual t-value. Hence, the coefficients that are in fact insignificant may be shown to be significant using the standard t-test. However, the coefficients are still unbiased and consistent.

To test for the presence of auto-correlation in the model, Durbin-Waston test is performed. The closer the DW value to 2, the less likely there is first order auto-correlation. In this dissertation, the model shows no auto-correlation, with a DW value of 1.137569. (Table 9)

6.4. Interpretation of results

Regression results from the model are shown in the Table 5. The signs and magnitudes of the coefficients are generally as expected. The model shows an adjusted R^2 of around 34%. This means that 34% of the variation in the dependent variable can be explained by the variation in the independent variables. The empirical

model shows an average explanatory power, as far as the generally low explanatory power of empirical retail study is concerned.

Table 9: Regression Result
Dependent Variable: LA
Method: Least Squares
Included observations: 358
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	180.6275	59.88360	3.016311	0.0027
	Type of Business			
TB_S***	687.8287	299.2609	2.298425	0.0221
TB_JW*	-318.9230	63.96710	-4.985735	0.0000
TB_GS*	-354.6919	75.97572	-4.668490	0.0000
TB_CP*	-375.2183	83.04852	-4.518061	0.0000
TB_E*	-296.8105	89.95440	-3.299566	0.0011
TB_BC*	-252.6755	57.21630	-4.416145	0.0000
TB_C*	-242.4024	64.41341	-3.763229	0.0002
TB_B***	302.5022	138.5798	2.182874	0.0297
TB_A*	-317.4148	63.08021	-5.031925	0.0000
	Location Attributes			
TS*	89.91565	28.01244	3.209847	0.0015
GCP*	155.2035	58.70344	2.643857	0.0086
	Proxy for Hypothesis			
FL**	21.84345	9.107207	2.398479	0.0170

R-squared	0.362027	Mean dependent var	163.3403
Adjusted R-squared	0.339836	S.D. dependent var	334.0991
S.E. of regression	271.4570	Akaike info criterion	14.08112
Sum squared resid	25422677	Schwarz criterion	14.22204
Log likelihood	-2507.521	F-statistic	16.31459
Durbin-Watson stat	1.137569	Prob(F-statistic)	0.000000

* Significant at the 1% level

** Significant at the 2% level

***Significant at the 3% level

- Business Type Attributes

All of nine dummy variables are found to be highly significant, showing that store size is significantly affected by the type of business operating inside. In fact, seven out of the nine dummies are found to be significant at the 1% level, with electronics and beauty products (who are significant at the 3% level) being the exceptions. The possibility of error comes from the fact that the sample size for those types of business is too small, as shown in Table 7. Besides, seven out of nine coefficients of dummies are found to be negative with large values (ranging between -375.2183 m^2 and -242.4024 m^2), showing that store sizes of those types of business are smaller than that of an ordinary restaurant. In contrast, businesses like running a book store or a supermarket generally have a larger store size than that of a restaurant, as shown by the positive coefficients ranging from 302.5022 m^2 and 687.8287 m^2.

- Location Attributes

Consistent with previous literatures that consider location as a major determinant of mall's success, all location dummies are found to be highly significant at the 1% level. In fact, the coefficients of two location dummies (TS and GCP) are found to be positive with a range from 89.91565 m^2 to 155.2035 m^2. This means that retail shops located at Langham Place is generally smaller than those located at Times Square and Grand Century Place. The reason does not only relate to the differences in total retail area of shopping centers but also managerial preferences of different mall managers. In fact, Times Square has the largest retail area among the malls, but its coefficient is proved to be smaller than that of Grand Century Place.

- Proxy for Hypothesis – Floor Level

The result generally agrees to the hypothesis. The floor level of a retail store is found to be positively correlated to the lettable area. The result shows that floor level is highly significant at 2% level. A coefficient of 21.84345 means that a shop located at a one-storey higher floor occupies around $22m^2$ more than one located beneath. Despite that some anchor stores occupy so much space that an area of $22m^2$ seems to be negligible, it is vital for some types of business like gifts and stationary in which the lettable area could be as small as $6.6m^2$.

7. Discussion

Having introduced the empirical model and interpreted the results, it will be meaningless if no reference and implication is made to the current study. Therefore, gaining insight from this study, recommendations will be provided for giving implication to management techniques in shopping center industry. Apart from this, limitations and further research areas of this study will be discussed in this section.

7.1. Implications of the study

7.1.1. Placement of anchor tenants

In Hong Kong, it is a general practice that anchor tenants tend to occupy a large area and the best locations (in terms of accessibility) in a shopping mall. Obviously, anchor tenants enjoy superior benefits over non-anchors, in terms of rental level, lease terms and choices of location.

However, it has not been shown that such a practice is beneficial to the mall's performance. In fact, in light of a betterment of pedestrian circulation within the center, placement of anchor tenant at the most accessible locations contradicts to their roles as a traffic generator. (Sim, L. L. and Cheok, R. W., 1989) It is pointless to say that placing a department store at the entrance floor can facilitate the overall pedestrian circulation of the mall.

In addition, such a practice hammers greatly the profitability of the center. Retail spaces at more accessible areas are more valuable than those located at less accessible areas. Mall managers could possibly charge a higher rent if retail spaces at more

accessible areas were leased out to tenants who occupy a small space. (R.S. Tay, C.K.Lau and M.S.Leung, 1999) Despite this, however, mall managers are used to accepting passively, rather than negotiating actively, the current practice, for fear of losing the anchors.

In this dissertation, this practice contradicts somehow to the finding. In this study, it is found that retail stores located at a higher level is larger in size. Hence, the finding further provides some evidences that support the view that the retail environment is ecological and retail activities are natural phenomena that may not be able to be changed artificially. (Yiu, C.Y., Yau, Y. and Li, N., 2007) Although it does not show that the natural phenomenon is better than the current practice which anchor tenants are artificially placed at the best locations, all these suggest possible review of the current practice which may give implications to mall operators.

According to the findings of this study and previous literatures, it is foreseeable that placement of anchor tenants at a high floor level can benefit both the mall operators and the anchor tenants. On one hand, anchor tenants could enjoy a low rental charge in order to compensate for the poor location. On the other hand, mall operators could gain extra profits if they divide the area (occupied by anchors) into smaller shops and lease them with a higher rental level. (R.S. Tay, C.K.Lau & M.S.Leung, 1999) Furthermore, mall developers could benefit from better pedestrian flow within the shopping center by locating anchors tenants at higher levels. (Miceli, T. J. & Sirmans, C. F. & Stake, D., 1998)

7.1.2. Guidance for retail leasing and positioning strategy

So far, no guideline in relation to leasing and positioning strategy has been formulated for mall managers to follow. Mall managers rely heavily on their respective experience in the industry. Information transfer between managers is unlikely possible due to commercial reasons. In light of this, the author hereby gives some suggestions based on the findings of this study. It is proposed that mall managers should try to avoid leasing a large area to one retailer on the lower floors. The reasons are similar to those for placement of anchors, which have been mentioned in the last paragraph.

Consistent with Nelson's view (1985), the author of this study agrees that low impulse trades (e.g. anchor tenants, satellite tenants and most service tenants) are of high planned demand and 'generative' business for customers had the demand to buy from the shops in advance. In contrast, high impulse trades (e.g. clothes, fashion boutiques, gifts and toy shops, etc.) are of low planned demand, so they need better location to sustain their business. Therefore, the author hereby proposes that retail shops selling high impulse products and occupying a small floor area are recommended to be located at the lower floors. Examples include jewellery and watches, fashion and accessories, beauty products and cosmetics. On the other hand, retail shops selling low impulse products and occupying a larger floor area are recommended to be located at the higher floors. Examples include restaurants or food court, cinemas, supermarkets and entertainment centers.

7.1.3. Ecosystem in Shopping Center Environment

The interdependence of the three stakeholders in shopping centers has not been well addressed in most academic studies. Although a number of authors mentioned the ecological nature of mall environments, no evidence was put forward until the ecological framework laid down by Yiu and Yau (2006). Obviously, such a framework becomes pointless without further empirical evidences. By showing that the relationship between floor levels and store sizes follows a natural phenomenon as predicted by ecology concepts, this study provides some evidence towards the applicability of ecology theories to explain the retail environment in shopping centers.

7.2. Limitations of the study

7.2.1. Small data base and low explanatory power

Due to a small sample size and a lack of previous literatures in the study, it is not possible to include too many variables (e.g. business type dummy variables) in the empirical model. The inclusion of more variables may increase the explanatory power of the empirical model. However, this will lead to an increase in the complexity of the analysis as well (Mason & Quigley, 1996). In this study, the model shows an average explanatory power with an adjusted R^2 of around 34%. The relationship between store sizes and floor levels identified in the study hence may not truly reflect the situation in the real world, as the effects of some factors are not taken into account.

7.2.2. Potential inaccuracy of measurement

Since all data are measured by hand, accuracy of measurement is unsecured. This may give rise to inconsistent measurement errors in the data base which may significantly affect the outcomes of the empirical model. This error is assumed to be constant throughout the measurement process.

7.2.3. Potential inconsistency of business type division

In this dissertation, data are divided into different categories according to the definitions of Hong Kong Retail Management Association. Some amendments were made to the definitions due to practical considerations. The amendments are not based on theories but personal judgments that make it different among people. Even with a clear definition, judgments were always involved when data was grouped into different categories. It certainly induces some complexities and inaccuracies to the study in practice. Indeed, the author admits that some judgments are quite difficult to be made, especially for shops selling multiple categories of products. To minimize this problem, visits to specific shops were arranged whenever uncertainties appear.

7.2.4. Over-simplified definition of accessibility

In this study, accessibility of a retail shop is defined as directly related to its floor level. The higher the floor level a shop is located, the more accessible it is. However, this definition is definitely over-simplified for at least two reasons. First, the accessibility of retail shops depends not only on the floor level at which they are

located but also on their respective locations on the same floor. In other words, shops located on the same floor level may exhibit different accessibilities in reality. Second, the positive effect of lifts and escalators on the accessibility of higher floor levels was not examined. The existence of lifts and escalators certainly affects the accessibility of a floor level and this may be significant enough to affect the result of this study. Without examinations of these factors, the relationship between store sizes and floor levels may never be found. However, these factors were ignored in this dissertation in order to control the complexity of the empirical model.

7.3. Further research areas

As mention in earlier chapters, there have been limited literatures related to multilevel shopping centers in Hong Kong. Thus, a lot of research areas can be further investigated. In this dissertation, the abiotic components of the retail environment in shopping centers are analogized to accessibility or location of the shop. However, as mentioned in Chapter 4, the biotic components (non-physical components) of the retail environment in shopping centers are not the focus of this study and there is a lack of empirical evidences in this area. Further researches can be organized to provide more scientific linkages between ecological theories (e.g. predation or parasitism) and mall phenomenon (e.g. tenant mix, competition or compatibility of retailers).

8. Conclusion

According to the regression result, it is found that retail stores located at higher floor levels are generally larger in size. The finding agrees with previous literatures that consider the retailing environment in malls as an ecosystem in which the three stakeholders (retailers, shoppers and mall managers) coexist and prosper. In other words, it further provides some evidence towards the idea that mall activities are ecological. Hence, the linkage between the two different academic disciplines is improved. Besides, clear guidelines are constructed in Chapter 7 for mall managers to follow when deciding the appropriate tenant placement and space allocation strategies.

Bibliography

- Abratt R, et al. (1985), Tenant Mix: the key to a successful shopping center, *Quarterly Review of Marketing Vol. 10 no. 3.*
- Alan A. Alexander (1983), *Managing the Shopping Center*, Institute of Real Estate Management of the National Association of Realtors, USA.
- Alan A. Alexander and Richard F. Muhlebach (1989), The Shopping Center: How is it different? *Journal of Property Management*, July/August 1989.
- Alan A. Alexander and Richard F. Muhlebach (1990), *Managing and Leasing Commercial Properties*, Canada: Wiley.
- Alan A. Alexander and Richard F. Muhlebach (1992), *Shopping Center Management*, USA: Institute of Real Estate Management.
- Begon, M., Townsend, C., Harper, J. (1996) *Ecology* (Third edition) Blackwell Science, London
- Beyard, M.D., W.P. O'Mara, et al. (1999) *Shopping Center Development Handbook*. Third Edition. Washington, D. C. ULI-the Urban Land Institute
- Brown, S. (1992), 'Tenant Mix, Tenant Placement and Shopper Behaviour in a Planned Shopping Center', *Services Industries Journal*, Vol. 12 no. 3.
- Brueckner, J. (1993), Inter-Store Externalities and Space Allocation in Shopping Centers, *Journal of Real Estate Finance and Economics*, 7, 5-16.
- Casazza, J. A. and F. H. Spink (1985), *Shopping Center Development Handbook*, Washington: Urban Land Institute, 2nd Edition
- Cha, T. W. (2001). Ecology, in Chung, C.J., Inaba, J., Koolhaas, R., Leong, S.T. & Cha, T.W. (eds) *Harvard Design School Guide to Shopping*, Taschen, Köln, pp. 321-335.
- Christopherson, Robert W. (1997) Geosystems: An Introduction to Physical

Geography 3rd (in english) Upper Saddle River, NJ, USA: Prentice Hall Inc.

- C. Irazábal and S. Chakravarty (2007) Entertainment-Retail Centers in Hong Kong and Los Angeles: Trends and Lessons. *International Planning Studies*, Aug2007, Vol. 12 Issue 3, p241-271, 31p
- Coleman, P. (2006), *Shopping environments: evolution, planning and design*, Architectural Press, Amsterdam.
- Dawson, J.A. (1983), *Topics in Applied Geography: Shopping Center Development*, Longman Group Ltd., London.
- Eppli, M. and J. Benjamin (1994), The Evolution of Shopping Center Research: A Review and Analysis, *Journal of Real Estate Research*, 9, 5-32.
- Eppli, M. and J. D. Shilling (1993), What's a Shopping Center Worth? American Real Estate Society, conference paper
- Goodland, R.J. (1975) The tropical origin of ecology: Eugen Warming's jubilee. *Oikos 26*, 240-245.
- MacArthur, R. H. and Wilson, E.O. (1967) *The Theory of Island Biogeography*, Princeton University Press, Princeton, N.J.
- Miceli, T. J. and Sirmans, C. F. and Stake, D. (1998) Optimal Competition and Allocation of Space in Shopping Centers, *Journal of Real Estate Research*, 1998, 16, 113-26
- Nelson, R. L. (1958) *The Selection of Retail Location*. F. W. Dodge Corporation, New York.
- Planning Department, Hong Kong Government (1992), *Hong Kong Planning Standards and Guidelines, Chapter 6, Retail Facilities*, Hong Kong Government Printer, Hong Kong.
- R.S. Tay, C.K.Lau and M.S.Leung (1999) The Determination of Rent in

Shopping Centers: Some Evidence from Hong Kong. *Journal of Real Estate Literature*; Jul99, Vol. 7 Issue 2, p183-196

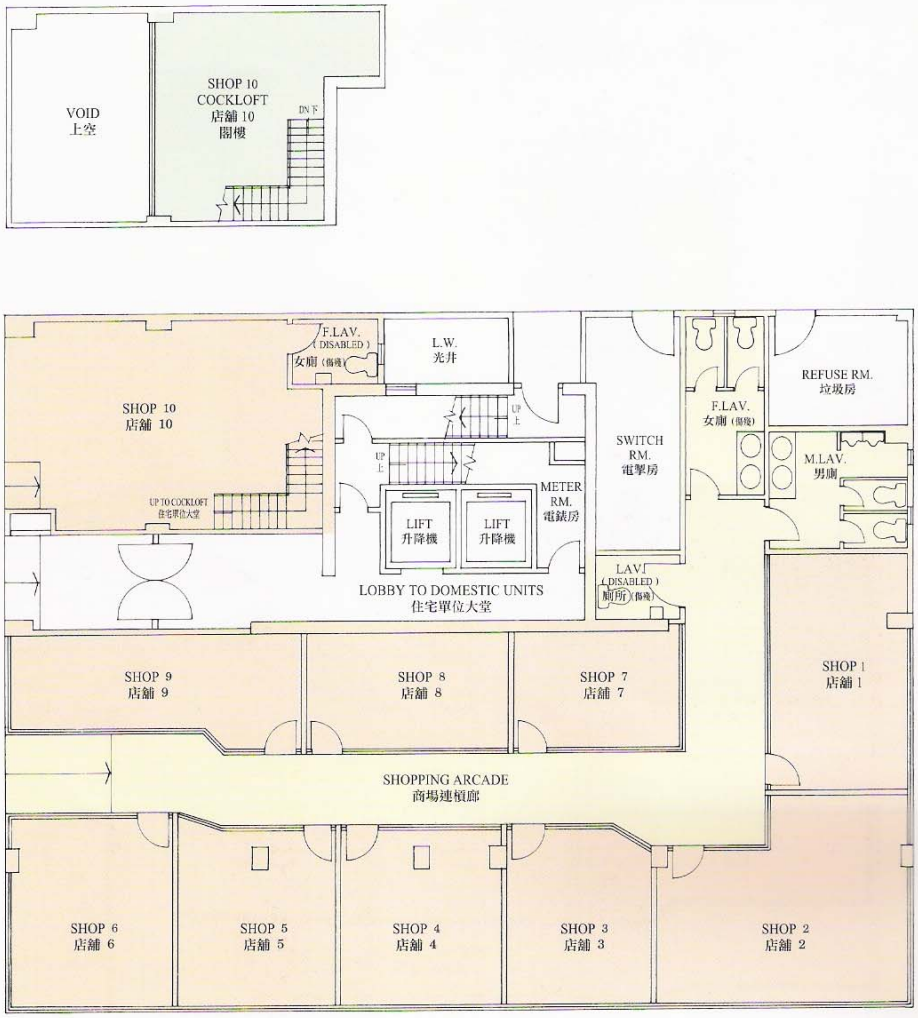
- S. Brown (1992) Tenant Mix, Tenant Placement and Shopper Behaviour in a Planned Shopping Center. *Service Industries Journal*; Jul92, Vol. 12 Issue 3, p384-403
- Simberloff, D.S. (1976) Experimental Zoogeography of Islands: Effects of Island Size. *Ecology* 57: 629-648.
- Sim, L. L. (1984) *A study of planned shopping centers in Singapore*, Singapore University Press, Singapore.
- Sim, L. L. and Cheok, R. W. (1989) Tenant Placement in a Singapore Shopping Center. *International Journal of Retailing*. 4(3); pp. 4-16.
- Singh, M.G., R. Cook, and M. Corstjens, "A Hybrid Knowledge-Based System for Allocating Retail Space and for Other Allocation Problems," *Interfaces*, Vol. 18, No. 5 (1988), pp. 13-22.
- S.M. Chiu and Y. Yau (2007) A necessary evil or an income driver? A preliminary study of public space in retail facilities in Hong Kong. *Journal of Retail & Leisure Property*; Dec2007, Vol. 6 Issue 4, p299-309
- S. Y. Lam (2001) The Effects of Store Environment on Shopping Behavior: A Critical Review. *Advances in Consumer Research*; 2001, Vol. 28 Issue 1, p190-197
- The Hong Kong Institute of Surveyors (1999) *Code of Measuring Practice*. HKIS, Hong Kong
- Ulanowicz, R. (1997) Ecology, the Ascendant Perspective. Columbia Univ. Press.
- Underhill, P. (2004) *Call of the Mall*, Simon & Schuster, New York.

- Website of Hong Kong Retail Management Association [n.d.] *Membership Directory Full Members* [online] Hong Kong. Available from http://www.hkrma.org/en/membership/fullMembers.jsp [Accessed 7 April, 2008]
- Website of National Research Bureau Online. Available from: http://www.claritas.com/charitas/Default.jsp [Accessed 5 April, 2008]
- Website of Sun Hung Kai Properties [n.d.] *Grand Century Place* [online] Hong Kong. Available from http://www.shkp.com.hk/html/grand_century_place/eng/management.html [Accessed 3 April 2008].
- Sun Hung Kai Properties [n.d.]*Grand Century Place* [online] Hong Kong. Available from http://www.shkp.com.hk/en/scripts/property/property_mall_gcp.php [Accessed 3 April 2008].
- Website of Times Square, Hong Kong. Available from http://www.timessquare.com.hk/en/module/about/index.php/ [Accessed 3 April 2008].
- Website of Wikipedia, *Langham Place, Hong Kong*, http://en.wikipedia.org/wiki/Langham_Place%2C_Hong_Kong [Accessed Apr. 3, 2008].
- Yiu, C.Y., Yau, Y. (2006) An Ecological Framework for the Strategic Positioning of a Shopping Mall. *Journal of Retail & Leisure Property,* 5(4), 270-280.
- Yiu, C.Y., Yau, Y. and Li, N. (2007) *Mall Retail-geography – An Empirical Study of Tenant Mix – Area Relationship*. Working Paper, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong.
- Yiu, C.Y., Yau, Y. and Li, N. (2007) A Quantitative Metric of Tenant Mix –

Retaildiversity of Malls in Hong Kong. Working Paper, Department of Real Estate and Construction, The University of Hong Kong, Hong Kong.

Appendix I

- Lettable area measurement (The Hong Kong Insititue of Surveyors, 1999)



NOTES:
註：

Lettable Area
租用面積

1. Lettable Area of whole floor (coloured ORANGE plus coloured YELLOW) shall be the space available for the exclusive use of the occupier as if the whole floor is taken up as a single unit i.e. including toilets and passageways but excluding common areas such as lift shafts, stairs, plant rooms and smoke lobbies. Lift lobby for access to domestics units shall be excluded.
全層樓之租用面積(橙色加上黃色)應可供用戶完全佔用的空間，即全層樓面由單一用戶使用。包括廁所和通廊，但不包括公用地方面積，如升降機槽、樓梯、機房和防煙廊，亦不包括通往住宅單位的升降機大堂的面積。

2. Lettable Area for sub-divided units shall be the saleable area of that unit (coloured PURPLE) plus a proportionate share of the communal toilets and passageways (coloured YELLOW) among sub-divided units on that floor.
分隔單位的租用面積包括該單位的實用面積(紫色)加上按該層分隔單位面積按比例攤分的公用廁所和通廊(黃色)。

3. The sum of total Lettable Areas of all sub-divided units on the floor shall be equivalent to the Lettable Area of the whole floor if occupied as one single unit.
所有該樓層的分隔單位租用面積的總和應相等於該樓層由單一租戶所佔用的租用面積。

Appendix II

- Data Base

Name	TB_S	TB_R	TB_C	TB_CP	TB_A	TB_BC	TB_E	TB_GS	TB_JW	TB_B	TS	LP	GCP	LA	FL
2%	0	0	1	0	0	0	0	0	0	0	0	0	1	145.3	3
(DG) Lifestyle Store	0	0	0	0	0	0	1	0	0	0	1	0	0	40.1	10
: Chocoolate	0	0	1	0	0	0	0	0	0	0	0	1	0	101.2	6
010 Maternity Wear	0	0	1	0	0	0	0	0	0	0	0	0	1	38.4	4
4˚C	0	0	0	0	0	0	0	0	1	0	1	0	0	19.4	5
80/20 & SALAD	0	0	1	0	0	0	0	0	0	0	0	0	1	169.7	3
A.P	0	0	0	0	1	0	0	0	0	0	0	1	0	3.8	9
A.T	0	0	0	0	1	0	0	0	0	0	1	0	0	46.4	5
AIX Armani Exchange	0	0	1	0	0	0	0	0	0	0	1	0	0	207.5	5
Ajisen Ramen	0	1	0	0	0	0	0	0	0	0	0	1	0	110.4	4
AJISEN RAMEN	0	1	0	0	0	0	0	0	0	0	0	0	1	171.1	1

Alexandre De Paris	0	0	0	0	0	0	0	0	1	0	1	0	0	31.6	6
Anna Sui	0	0	1	0	0	0	0	0	0	0	1	0	0	91.2	4
another Fashion Community Kitterick	0	0	1	0	0	0	0	0	0	0	0	0	1	307.3	3
ans	0	0	0	0	1	0	0	0	0	0	0	1	0	40.8	3
Anteprima-Plastiq	0	0	0	0	1	0	0	0	0	0	1	0	0	26.6	4
Apivita	0	0	0	0	0	1	0	0	0	0	0	1	0	24.5	2
Aquascutum	0	0	1	0	0	0	0	0	0	0	1	0	0	213.2	4
area 0264	0	0	0	0	1	0	0	0	0	0	0	1	0	30.9	6
Arirang Korean Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	507.2	12
Artini	0	0	0	0	0	0	0	0	1	0	0	0	1	49.3	1
Aveda	0	0	0	0	0	1	0	0	0	0	0	1	0	51.7	2
Azabu Sabo	0	1	0	0	0	0	0	0	0	0	0	0	1	41	1
azona a02	0	0	1	0	0	0	0	0	0	0	0	1	0	82.7	5
b + ab	0	0	1	0	0	0	0	0	0	0	0	0	1	95.5	3
b+ab	0	0	1	0	0	0	0	0	0	0	0	1	0	573.1	5

b+ab	0	0	1	0	0	0	0	0	0	0	1	0	0	73.9	6
Baby Jane Cacharel	0	0	1	0	0	0	0	0	0	0	1	0	0	65.2	6
Bamboo Restaurant	0	1	0	0	0	0	0	0	0	0	0	1	0	189.5	4
Basic House	0	0	1	0	0	0	0	0	0	0	0	0	1	84.7	3
Bauhaus	0	0	1	0	0	0	0	0	0	0	0	1	0	113.2	5
Bauhaus	0	0	1	0	0	0	0	0	0	0	0	0	1	91.7	3
BB Laboratories	0	0	0	0	0	1	0	0	0	0	0	1	0	8.5	2
BeBe Dream	0	0	0	1	0	0	0	0	0	0	0	0	1	89.2	4
Berik	0	0	1	0	0	0	0	0	0	0	0	1	0	80.4	5
Berlin Optical	0	0	0	0	1	0	0	0	0	0	1	0	0	56.6	10
Bess	0	0	1	0	0	0	0	0	0	0	0	0	1	57.8	2
Betty Boop	0	0	0	1	0	0	0	0	0	0	0	0	1	37.5	4
Bijoux De Pricesse	0	0	0	0	1	0	0	0	0	0	0	0	1	51.5	1
Bioderma Laboratoire Dermatologique	0	0	0	0	0	1	0	0	0	0	0	1	0	44.3	2
Bla Bla Bra	0	0	1	0	0	0	0	0	0	0	0	1	0	31.5	9

BOBBI BROWN	0	0	0	0	0	1	0	0	0	0	0	0	1	42.1	1
Bon Bon Girl	0	0	1	0	0	0	0	0	0	0	0	1	0	34.4	6
Bossini	0	0	1	0	0	0	0	0	0	0	0	0	1	672.11	2
bread n butter	0	0	1	0	0	0	0	0	0	0	0	1	0	162.8	5
bread n butter	0	0	1	0	0	0	0	0	0	0	0	0	1	75.7	3
Broadway	0	0	0	0	0	0	1	0	0	0	0	0	1	129.5	1
Brooks Brother	0	0	1	0	0	0	0	0	0	0	1	0	0	101.6	4
bubble	0	0	1	0	0	0	0	0	0	0	0	1	0	28	6
Café de coral	0	1	0	0	0	0	0	0	0	0	0	0	1	253.4	3
California Pizza Kitchen	0	1	0	0	0	0	0	0	0	0	1	0	0	389.9	14
Calvin Klein Underwear	0	0	1	0	0	0	0	0	0	0	1	0	0	42.8	6
Camela	0	0	1	0	0	0	0	0	0	0	0	0	1	52.9	2
Camper	0	0	0	0	1	0	0	0	0	0	1	0	0	38.3	6
Catalog	0	0	1	0	0	0	0	0	0	0	0	1	0	114.6	6
Catalog	0	0	1	0	0	0	0	0	0	0	0	0	1	109.1	3

ceu yume	0	0	1	0	0	0	0	0	0	0	0	0	1	107.1	3
Chao Inn	0	1	0	0	0	0	0	0	0	0	0	0	1	767.9	6
Charcoal Grey	0	0	1	0	0	0	0	0	0	0	0	1	0	36.8	5
Charles Jourdan	0	0	1	0	0	0	0	0	0	0	1	0	0	117	4
Che2	0	0	0	0	0	0	0	1	0	0	1	0	0	20.7	5
Chee Kee	0	1	0	0	0	0	0	0	0	0	0	1	0	116.2	4
Chevignon	0	0	1	0	0	0	0	0	0	0	0	0	1	69.9	3
Chic Chic	0	0	0	0	1	0	0	0	0	0	0	1	0	22.6	10
Chicco	0	0	0	1	0	0	0	0	0	0	0	0	1	88.6	4
Chickeeduck	0	0	0	1	0	0	0	0	0	0	1	0	0	58.8	10
Chickeeduck	0	0	0	1	0	0	0	0	0	0	0	0	1	103.2	4
China Land Restaurant	0	1	0	0	0	0	0	0	0	0	0	0	1	687.5	6
Chow Sang Sang Jewellery	0	0	0	0	0	0	0	0	1	0	0	0	1	44.1	1
Chung's Cuisine	0	1	0	0	0	0	0	0	0	0	1	0	0	614.8	11
City Chain	0	0	0	0	0	0	0	0	1	0	0	0	1	50.7	2

Club Monaco	0	0	1	0	0	0	0	0	0	0	1	0	0	169.2	6
C'N'C Costume National	0	0	1	0	0	0	0	0	0	0	1	0	0	41	4
Color Rich	0	0	0	0	0	0	0	1	0	0	0	1	0	115.2	8
Colour Eighteen	0	0	1	0	0	0	0	0	0	0	1	0	0	142.6	6
Colourmix	0	0	0	0	0	1	0	0	0	0	0	0	1	83.9	2
Comio Boo	0	0	0	1	0	0	0	0	0	0	1	0	0	64.7	10
CO-OP	0	0	1	0	0	0	0	0	0	0	0	1	0	19.3	9
Cour Carre	0	0	1	0	0	0	0	0	0	0	0	0	1	99.2	2
Crabtree & Evelyn	0	0	0	0	0	1	0	0	0	0	1	0	0	30.1	4
Crabtree & Evelyn	0	0	0	0	0	1	0	0	0	0	0	0	1	42.9	1
Crystal World	0	0	0	0	0	0	0	1	0	0	0	0	1	6.6	4
ctf2 Jewellery	0	0	0	0	0	0	0	0	1	0	0	0	1	38.1	1
CUBIC	0	0	1	0	0	0	0	0	0	0	0	1	0	27.5	10
Da hood	0	0	1	0	0	0	0	0	0	0	0	1	0	51	5
Damnwell	0	0	1	0	0	0	0	0	0	0	0	1	0	8.3	10

Delifrance	0	1	0	0	0	0	0	0	0	0	0	1	0	78.4	4
Delifrance	0	1	0	0	0	0	0	0	0	0	0	0	1	77.1	1
DHC	0	0	0	0	0	1	0	0	0	0	0	0	1	35.8	1
Digital Spot	0	0	0	0	0	0	1	0	0	0	1	0	0	139.7	10
Disc Plus	0	0	0	0	0	0	0	1	0	0	1	0	0	155.7	10
D-mop	0	0	1	0	0	0	0	0	0	0	0	1	0	311.9	6
D-Mop	0	0	1	0	0	0	0	0	0	0	1	0	0	291.8	5
double-park	0	0	1	0	0	0	0	0	0	0	0	1	0	573.1	5
double-park	0	0	1	0	0	0	0	0	0	0	0	0	1	163.3	3
Dr. Kong Footcare	0	0	0	0	1	0	0	0	0	0	0	0	1	40.8	4
D'urban	0	0	1	0	0	0	0	0	0	0	1	0	0	42.1	5
Elegant Watch & Jewellery	0	0	0	0	0	0	0	0	1	0	1	0	0	84.4	5
Ella & Ella Bits	0	0	0	0	0	0	0	1	0	0	0	0	1	72.9	4
Elle	0	0	0	1	0	0	0	0	0	0	1	0	0	44.7	10
Emphasis Jewellery	0	0	0	0	0	0	0	0	1	0	0	0	1	69.6	1

Enigma	0	0	1	0	0	0	0	0	0	0	0	0	1	55.1	3
Episode	0	0	1	0	0	0	0	0	0	0	1	0	0	223.9	4
Esprit & Red Earth	0	0	1	0	0	0	0	0	0	0	0	0	1	434.1	2
Essence Beauty & Fragrances	0	0	0	0	0	1	0	0	0	0	0	1	0	16.2	2
Eu Yan Sang	0	0	0	0	0	0	0	1	0	0	0	0	1	71.2	4
euro go go	0	1	0	0	0	0	0	0	0	0	0	1	0	101.4	9
extravaganza	0	0	1	0	0	0	0	0	0	0	0	1	0	254	5
F.C.K.	0	0	1	0	0	0	0	0	0	0	0	1	0	428.3	6
FABLES AZ	0	0	0	1	0	0	0	0	0	0	0	0	1	59	4
Fablesaz	0	0	0	1	0	0	0	0	0	0	1	0	0	122	10
Fairwood	0	1	0	0	0	0	0	0	0	0	0	0	1	324.4	3
Fancl House	0	0	0	0	0	1	0	0	0	0	1	0	0	18.9	4
Fancl House	0	0	0	0	0	1	0	0	0	0	0	0	1	46.4	1
Fiorucci	0	0	0	0	1	0	0	0	0	0	1	0	0	41.5	5
Fiorucci	0	0	0	0	1	0	0	0	0	0	0	0	1	57.4	3

Folli Follie	0	0	0	0	0	0	0	0	1	0	1	0	0	27.9	6
Food Court	0	1	0	0	0	0	0	0	0	0	0	0	1	1246.6	4
Fornarina	0	0	1	0	0	0	0	0	0	0	1	0	0	142.9	6
Fossil	0	0	1	0	0	0	0	0	0	0	1	0	0	50.8	6
Fotomax	0	0	0	0	0	0	0	1	0	0	1	0	0	35.9	10
Fotomax	0	0	0	0	0	0	0	1	0	0	0	0	1	48.7	4
French Collection	0	0	1	0	0	0	0	0	0	0	1	0	0	299.3	6
Funky Gabe	0	0	1	0	0	0	0	0	0	0	0	1	0	24.4	5
Furla	0	0	0	0	1	0	0	0	0	0	1	0	0	68.3	5
FX Creations	0	0	0	0	1	0	0	0	0	0	0	0	1	40.9	3
G & An'ge	0	0	1	0	0	0	0	0	0	0	0	0	1	46.5	2
G2000	0	0	1	0	0	0	0	0	0	0	0	0	1	164	2
Gant	0	0	1	0	0	0	0	0	0	0	1	0	0	85.7	6
Genki sushi	0	1	0	0	0	0	0	0	0	0	0	1	0	146.3	4
Giffarine	0	0	0	0	0	1	0	0	0	0	0	1	0	57.6	2

Global Timepieces Ltd.	0	0	0	0	0	0	0	0	1	0	0	0	1	52.8	1
Goessele	0	0	0	0	0	0	0	0	1	0	0	0	1	54.8	1
Golden Bull Vietnamese Cuisine	0	1	0	0	0	0	0	0	0	0	1	0	0	409	12
Golden Bull Vietnamese Cuisine	0	1	0	0	0	0	0	0	0	0	0	0	1	288.5	6
Golden Time Antique Watches	0	0	0	0	0	0	0	0	1	0	0	0	1	12.8	2
Haagen-Daza	0	1	0	0	0	0	0	0	0	0	0	0	1	11	1
Hallmark	0	0	0	0	0	0	0	1	0	0	1	0	0	44.7	10
Hallmark Babies	0	0	0	1	0	0	0	0	0	0	0	0	1	60.1	4
Hang Fa Lau	0	1	0	0	0	0	0	0	0	0	0	0	1	49.9	2
Heichinrou Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	974.4	11
Hiroshima	0	0	0	0	1	0	0	0	0	0	0	0	1	19.3	3
HK Seibu	1	0	0	0	0	0	0	0	0	0	0	1	0	397.8	1
Honeymoon Dessert	0	1	0	0	0	0	0	0	0	0	0	1	0	47.4	4
http://www.izzue.com	0	0	1	0	0	0	0	0	0	0	0	0	1	204.1	3
Hunan Garden	0	1	0	0	0	0	0	0	0	0	1	0	0	655.2	14

i.s.o	0	0	1	0	0	0	0	0	0	0	0	1	0	55	6
i.t	0	0	1	0	0	0	0	0	0	0	0	1	0	991.3	3
i.t	0	0	1	0	0	0	0	0	0	0	1	0	0	331.6	6
I.T.	0	0	1	0	0	0	0	0	0	0	1	0	0	326.2	4
ich	0	0	0	0	0	0	0	1	0	0	0	1	0	37	10
Ignition Point	0	0	0	0	0	0	0	1	0	0	0	0	1	14.7	4
IL Colpo	0	0	0	0	0	1	0	0	0	0	1	0	0	306.2	10
Image In	0	0	0	0	0	0	0	1	0	0	0	0	1	17.2	4
imaroon & sequoia	0	0	1	0	0	0	0	0	0	0	0	1	0	174.3	6
Ingrid Millet	0	0	0	0	0	1	0	0	0	0	0	1	0	11.1	2
Initial	0	0	1	0	0	0	0	0	0	0	0	1	0	50	10
InNiu	0	0	0	0	1	0	0	0	0	0	1	0	0	77.4	4
Inshoesnet	0	0	0	0	1	0	0	0	0	0	0	0	1	91.6	3
Insight Optical	0	0	0	0	1	0	0	0	0	0	1	0	0	55.9	10
ISA Knox	0	0	0	0	0	1	0	0	0	0	0	1	0	40.1	2

Italian Tomato Café Jr.	0	1	0	0	0	0	0	0	0	0	0	1	0	138.2	4
item's	0	0	1	0	0	0	0	0	0	0	0	1	0	23	9
IZE	0	0	0	0	1	0	0	0	0	0	0	0	1	49	2
IZM	0	0	1	0	0	0	0	0	0	0	0	1	0	31.9	9
Japanese Dining SUN	0	1	0	0	0	0	0	0	0	0	1	0	0	209.5	14
JC Shop / JC Ladies	0	0	0	0	0	0	1	0	0	0	1	0	0	100	10
Jessica	0	0	1	0	0	0	0	0	0	0	1	0	0	295.8	5
Jill Scott	0	0	0	0	1	0	0	0	0	0	0	1	0	27.8	3
Jolie J.	0	0	1	0	0	0	0	0	0	0	0	0	1	42.7	2
Joliesse	0	0	0	0	0	0	0	0	1	0	0	0	1	20.1	1
Joy & Peace	0	0	0	0	1	0	0	0	0	0	0	0	1	101.5	2
Joyce Beauty	0	0	0	0	0	1	0	0	0	0	1	0	0	47.1	4
JP Books	0	0	0	0	0	0	0	0	0	1	0	0	1	519.8	2
J's Duet	0	0	0	0	0	0	0	0	1	0	0	1	0	46	3
J's Duet	0	0	0	0	0	0	0	0	1	0	0	0	1	26.6	1

Juicy Couture	0	0	1	0	0	0	0	0	0	0	1	0	0	112.8	4
Jumbo Grade - Newspaper & Magazine	0	0	0	0	0	0	0	1	0	0	0	0	1	15.7	1
Jurlique	0	0	0	0	0	1	0	0	0	0	0	0	1	23.1	1
Kappa	0	0	1	0	0	0	0	0	0	0	0	0	1	41.5	4
Kate Spade New York	0	0	0	0	1	0	0	0	0	0	1	0	0	70.8	4
KI*LA*RA	0	0	1	0	0	0	0	0	0	0	0	1	0	38.1	5
Kids Wonderland	0	0	0	1	0	0	0	0	0	0	0	0	1	62.1	4
Kiehl's	0	0	0	0	0	1	0	0	0	0	0	1	0	26.1	2
Kimchee Korean Restaurant	0	1	0	0	0	0	0	0	0	0	0	0	1	210.3	3
King Palace Chinese Restaurant	0	1	0	0	0	0	0	0	0	0	0	0	1	1347	6
Kingkow	0	0	0	1	0	0	0	0	0	0	1	0	0	79.3	10
Kingkow	0	0	0	1	0	0	0	0	0	0	0	0	1	45.3	4
Kookai	0	0	1	0	0	0	0	0	0	0	1	0	0	98	6
La Compagnie Des Petits	0	0	0	1	0	0	0	0	0	0	0	0	1	54	4
La Fleche	0	0	1	0	0	0	0	0	0	0	0	1	0	28.5	9

Lancel	0	0	0	0	1	0	0	0	0	0	1	0	0	20.5	4
Lane Crawford	1	0	0	0	0	0	0	0	0	0	1	0	0	2261.5	1
Laneige	0	0	0	0	0	1	0	0	0	0	0	0	1	42.5	1
Lanna Thai	0	1	0	0	0	0	0	0	0	0	1	0	0	564.9	12
Laosmiddle	0	0	1	0	0	0	0	0	0	0	0	1	0	141.7	10
Le Fauchon Colour Café	0	1	0	0	0	0	0	0	0	0	0	0	1	308.5	2
Le Saunda	0	0	0	0	1	0	0	0	0	0	0	0	1	125.2	2
Learn & Play	0	0	0	1	0	0	0	0	0	0	0	0	1	56.9	4
Leo	0	0	1	0	0	0	0	0	0	0	0	0	1	103.7	2
LeSportsac	0	0	0	0	1	0	0	0	0	0	1	0	0	50.2	5
Levi's	0	0	1	0	0	0	0	0	0	0	0	0	1	121.7	3
Lids	0	0	0	0	1	0	0	0	0	0	0	1	0	21.5	6
Little Beetles	0	0	0	1	0	0	0	0	0	0	1	0	0	53.7	10
L'Occitane	0	0	0	0	0	1	0	0	0	0	0	1	0	80.6	2
Longchamp	0	0	0	0	1	0	0	0	0	0	1	0	0	80.8	4

L'Oreal Paris	0	0	0	0	0	1	0	0	0	0	0	1	0	45.8	2
Lovely Lace	0	0	0	0	0	0	0	1	0	0	0	1	0	38.9	8
LUSH	0	0	0	0	0	1	0	0	0	0	0	1	0	18.2	2
Ma Belle	0	0	0	0	0	0	0	0	1	0	1	0	0	21.2	5
Mabelle	0	0	0	0	0	0	0	0	1	0	0	0	1	36.8	1
Mac Look	0	0	0	0	1	0	0	0	0	0	0	1	0	28	5
Mannings	1	0	0	0	0	0	0	0	0	0	0	0	1	259.1	1
Marco & Mari	0	0	0	1	0	0	0	0	0	0	0	0	1	41.6	4
Marks & Spencer	0	0	1	0	0	0	0	0	0	0	1	0	0	268.9	5
Mastina	0	0	1	0	0	0	0	0	0	0	0	0	1	71	2
MatchTOO Café	0	1	0	0	0	0	0	0	0	0	0	1	0	133.5	4
Maud Frizon Paris	0	0	0	0	1	0	0	0	0	0	0	0	1	46.5	2
Max & Co	0	0	1	0	0	0	0	0	0	0	1	0	0	77.6	5
Maxim's Palace Chinese Restaurant	0	1	0	0	0	0	0	0	0	0	0	0	1	3766.1	7
Maybelline New York	0	0	0	0	0	1	0	0	0	0	0	1	0	24.6	5

McDonald's	0	1	0	0	0	0	0	0	0	0	0	0	1	150.9	1
McDonald's & McCafe	0	1	0	0	0	0	0	0	0	0	0	1	0	142.3	2
McQuarter	0	0	0	0	0	0	0	1	0	0	0	0	1	27.4	3
Melani	0	0	1	0	0	0	0	0	0	0	0	0	1	71.1	2
Melani di moda & Passion 1	0	0	1	0	0	0	0	0	0	0	0	1	0	83.3	6
MENARD	0	0	0	0	0	1	0	0	0	0	0	0	1	17.9	1
Merrell / cat	0	0	0	0	1	0	0	0	0	0	1	0	0	92.4	6
Miki House	0	0	0	1	0	0	0	0	0	0	1	0	0	37.2	10
Ming General Japanese Sushi Restaurant	0	1	0	0	0	0	0	0	0	0	0	0	1	303.4	3
Mioggi	0	0	0	0	0	1	0	0	0	0	0	0	1	40.4	1
Mirabell	0	0	0	0	1	0	0	0	0	0	0	0	1	123.8	3
mi-tu	0	0	1	0	0	0	0	0	0	0	1	0	0	56.8	6
Modern China Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	699	11
Moiselle	0	0	1	0	0	0	0	0	0	0	0	0	1	151.3	2
Montblanc	0	0	0	0	0	0	0	0	1	0	1	0	0	59.6	4

Morgan	0	0	1	0	0	0	0	0	0	0	1	0	0	133.7	5
Mos Burger	0	1	0	0	0	0	0	0	0	0	0	1	0	68.2	4
Mothercare	0	0	0	1	0	0	0	0	0	0	0	0	1	91.5	4
Moussy	0	0	1	0	0	0	0	0	0	0	1	0	0	124.1	6
Mrs. Fields Cookies	0	1	0	0	0	0	0	0	0	0	0	0	1	32.6	1
Mukai	0	0	0	0	1	0	0	0	0	0	0	0	1	34.4	2
MVPlus	0	0	1	0	0	0	0	0	0	0	0	0	1	68.6	3
My Jewelry	0	0	0	0	0	0	0	0	1	0	0	0	1	31	1
Namco	0	0	0	0	0	0	0	1	0	0	0	1	0	109.2	9
NI-JI…LADIES	0	0	1	0	0	0	0	0	0	0	0	1	0	8.9	9
ODF	0	0	1	0	0	0	0	0	0	0	0	0	1	67	2
Optical 88	0	0	0	0	1	0	0	0	0	0	0	0	1	81.2	1
ORBIS	0	0	0	0	0	1	0	0	0	0	0	1	0	30.3	2
Orbis	0	0	0	0	0	1	0	0	0	0	1	0	0	35	4
Origins	0	0	0	0	0	1	0	0	0	0	0	0	1	29.1	1

Orla Kiely	0	0	0	0	1	0	0	0	0	0	1	0	0	52.7	6
Pacific Coffee	0	1	0	0	0	0	0	0	0	0	0	1	0	55.1	4
PageOne Bookshop	0	0	0	0	0	0	0	0	0	1	1	0	0	953.7	10
Paper'n things	0	0	0	0	0	0	0	1	0	0	1	0	0	122.8	10
Paradiso	0	0	1	0	0	0	0	0	0	0	0	0	1	76.5	2
Parsons Music	0	0	0	0	0	0	1	0	0	0	1	0	0	407.7	10
Patrizia Pepe	0	0	1	0	0	0	0	0	0	0	1	0	0	69.8	4
PAUL & JOE	0	0	0	0	0	1	0	0	0	0	0	1	0	7.6	2
pe:tite	0	0	1	0	0	0	0	0	0	0	0	1	0	39.8	6
Pe:tite	0	0	1	0	0	0	0	0	0	0	0	0	1	61.5	3
Pedder Red	0	0	0	0	1	0	0	0	0	0	1	0	0	72.5	6
People's Republic	0	0	1	0	0	0	0	0	0	0	0	0	1	116.2	3
Photo Land	0	0	0	0	0	0	0	1	0	0	0	0	1	87.4	4
PINK ARMY	0	0	1	0	0	0	0	0	0	0	0	1	0	49.6	6
Pinky Girls	0	0	1	0	0	0	0	0	0	0	1	0	0	50.3	6

Plata	0	0	0	0	1	0	0	0	0	0	0	0	1	71.1	3
PN	0	0	0	0	0	0	0	0	1	0	0	0	1	41.6	1
Pokka Café	0	1	0	0	0	0	0	0	0	0	0	0	1	273.3	2
Pop	0	0	0	0	1	0	0	0	0	0	0	1	0	21.3	6
Precious Memory	0	0	0	0	0	0	0	1	0	0	0	0	1	33.8	3
princess	0	0	1	0	0	0	0	0	0	0	0	1	0	28.1	10
Princess's Secret	0	0	0	0	1	0	0	0	0	0	0	1	0	15.7	10
Private Shop	0	0	1	0	0	0	0	0	0	0	1	0	0	43.2	6
Private Shop	0	0	1	0	0	0	0	0	0	0	0	0	1	48.7	3
PST Bird's Nest & Ginseng Shop	0	0	0	0	0	0	0	1	0	0	0	0	1	35.7	4
Pudding	0	0	1	0	0	0	0	0	0	0	0	1	0	20.7	10
Puzzles & Quiz	0	0	0	0	0	0	0	1	0	0	0	0	1	32.1	4
Quiksilver	0	0	1	0	0	0	0	0	0	0	0	0	1	221.3	3
R:fm2	0	0	1	0	0	0	0	0	0	0	0	1	0	37.4	10
Red Box	0	1	0	0	0	0	0	0	0	0	0	0	1	733.9	6

Renaissance	0	0	0	0	0	0	0	0	1	0	0	0	1	9.6	2
Sa Sa Cosmetic Co. Ltd.	0	0	0	0	0	1	0	0	0	0	0	0	1	201.7	1
Saint's ALP Teahouse	0	1	0	0	0	0	0	0	0	0	0	1	0	94.4	8
Salon ide	0	0	0	0	0	1	0	0	0	0	0	0	1	178.6	2
Salvatore Ferragamo	0	0	0	0	1	0	0	0	0	0	1	0	0	238	1
Sanrio Kids	0	0	0	1	0	0	0	0	0	0	0	0	1	105.4	4
Sarelle	0	0	0	0	0	0	0	0	1	0	0	0	1	31.7	2
Shanghai Viao Nan Guo Cuisine	0	1	0	0	0	0	0	0	0	0	1	0	0	483.7	13
Shark's Fin city Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	636.5	12
Shiseido	0	0	0	0	0	1	0	0	0	0	0	0	1	42.1	1
shu uemura	0	0	0	0	0	1	0	0	0	0	0	1	0	73.8	2
Simply Thai	0	1	0	0	0	0	0	0	0	0	1	0	0	323.8	12
simply thai	0	1	0	0	0	0	0	0	0	0	0	0	1	213.9	4
Sincere	1	0	0	0	0	0	0	0	0	0	0	0	1	1079.3	3
Sincere	1	0	0	0	0	0	0	0	0	0	0	0	1	2890.9	2

Sinequanone	0	0	1	0	0	0	0	0	0	0	1	0	0	80.5	5
Sing Kwong Jewellery	0	0	0	0	0	0	0	0	1	0	0	0	1	33.1	1
Sisley	0	0	1	0	0	0	0	0	0	0	1	0	0	117.6	5
SJ-SJ	0	0	1	0	0	0	0	0	0	0	1	0	0	47.5	4
Skinfood	0	0	0	0	0	1	0	0	0	0	0	0	1	48.7	1
smashbox	0	0	0	0	0	1	0	0	0	0	0	1	0	13.1	2
SmiLemon	0	0	0	0	1	0	0	0	0	0	0	0	1	30.8	2
SNOOPY	0	0	1	0	0	0	0	0	0	0	0	1	0	31.5	8
Sofia's Gift Collection	0	0	0	0	0	0	0	1	0	0	0	0	1	27.4	4
Sport Corners - exclusive for HER	0	0	1	0	0	0	0	0	0	0	0	0	1	111.3	3
Sport. B	0	0	1	0	0	0	0	0	0	0	1	0	0	163.6	6
Sports Corners	0	0	1	0	0	0	0	0	0	0	0	0	1	159.3	4
Staccato	0	0	0	0	1	0	0	0	0	0	0	0	1	63.4	2
Stage of Playlord	0	0	1	0	0	0	0	0	0	0	0	0	1	105.7	2
Stage of Playlord	0	0	1	0	0	0	0	0	0	0	0	0	1	143	3

Starbucks Coffee	0	1	0	0	0	0	0	0	0	0	0	1	0	59.3	4
Stone Age	0	0	0	0	1	0	0	0	0	0	0	1	0	9.9	10
Stone Planet the Natural Rock Crystal	0	0	0	0	1	0	0	0	0	0	0	1	0	5.9	10
Strawberry Forever Dessert Café	0	1	0	0	0	0	0	0	0	0	0	0	1	103.7	1
SunLAss Hut	0	0	0	0	1	0	0	0	0	0	0	1	0	35.9	5
Super Star Seafood Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	1275.8	11
Suzuya	0	0	1	0	0	0	0	0	0	0	0	0	1	60.6	2
Swarovski	0	0	0	0	0	0	0	1	0	0	0	1	0	61	1
Swarovski	0	0	0	0	0	0	0	1	0	0	0	0	1	87.9	2
Tai Lin Radio Service Ltd	0	0	0	0	0	0	1	0	0	0	1	0	0	204.7	10
Thai Orchids Café & Bar	0	1	0	0	0	0	0	0	0	0	0	1	0	151	8
The Body Shop	0	0	0	0	0	1	0	0	0	0	0	1	0	33.3	2
The Body Shop	0	0	0	0	0	1	0	0	0	0	0	0	1	56	1
The Cleopatra Palace	0	0	0	0	0	1	0	0	0	0	0	0	1	25.6	4
The L.S Collection	0	0	0	0	0	0	0	1	0	0	0	0	1	41	1

The Palace, Prince & Princess	0	0	0	0	0	0	0	1	0	0	1	0	0	61	10
The Pearl Farm	0	0	0	0	0	0	0	0	1	0	0	0	1	28.6	1
The Spaghetti House	0	1	0	0	0	0	0	0	0	0	0	0	1	232.1	4
Timberland	0	0	1	0	0	0	0	0	0	0	0	0	1	100.2	3
Tissot	0	0	0	0	0	0	0	0	1	0	0	1	0	22.4	1
tommie cebra	0	0	0	1	0	0	0	0	0	0	0	0	1	26.9	4
Tommy Hilfiger	0	0	1	0	0	0	0	0	0	0	1	0	0	153.7	6
Tonino Lamborghini	0	0	1	0	0	0	0	0	0	0	0	1	0	18.2	2
Tonino Lamborghini	0	0	1	0	0	0	0	0	0	0	0	0	1	79	2
Toonsland Limited	0	0	0	1	0	0	0	0	0	0	0	0	1	161.4	4
TOP IN FASHION	0	0	1	0	0	0	0	0	0	0	0	1	0	28	10
Unknown Pleasure	0	0	0	0	1	0	0	0	0	0	0	1	0	42.2	6
Veeko	0	0	1	0	0	0	0	0	0	0	0	0	1	112.5	2
Vertical Club	0	0	1	0	0	0	0	0	0	0	0	0	1	97.5	2
Very	0	0	1	0	0	0	0	0	0	0	0	0	1	61.2	2

VIOLA	0	0	1	0	0	0	0	0	0	0	0	0	1	157.3	2
Vivenne Tam	0	0	1	0	0	0	0	0	0	0	1	0	0	121.3	4
Vivienne Westwood	0	0	0	0	1	0	0	0	0	0	1	0	0	13.3	4
Walker Shop	0	0	0	0	1	0	0	0	0	0	0	0	1	117.3	3
Wanko	0	0	1	0	0	0	0	0	0	0	0	0	1	97.5	3
WasabiSabi	0	1	0	0	0	0	0	0	0	0	1	0	0	583.6	14
Watson's	1	0	0	0	0	0	0	0	0	0	0	0	1	304.3	4
Wellcome	1	0	0	0	0	0	0	0	0	0	0	0	1	957	6
Wu Kong Shanghai Restaurant	0	1	0	0	0	0	0	0	0	0	1	0	0	390.3	14
X-Game	0	0	1	0	0	0	0	0	0	0	0	1	0	143	9
YMK	0	0	0	0	1	0	0	0	0	0	0	0	1	42.9	1
Y-not Kids	0	0	0	1	0	0	0	0	0	0	0	0	1	21	4
Yoco Accessories	0	0	0	0	1	0	0	0	0	0	0	0	1	27	2
YOSHINOYA	0	1	0	0	0	0	0	0	0	0	0	1	0	68.4	4
Zara	1	0	0	0	0	0	0	0	0	0	1	0	0	634	4

Zara	1	0	0	0	0	0	0	0	0	0	1	0	0	645.9	4
ZOLA	0	0	1	0	0	0	0	0	0	0	0	1	0	38.9	8